

**EIGHT NEW SPECIES OF *MACROSIPHUM* PASSERINI (HEMIPTERA:
APHIDIDAE) FROM WESTERN NORTH AMERICA, WITH NOTES ON FOUR
OTHER POORLY KNOWN SPECIES**

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Abstract.—Eight new species of *Macrosiphum* from western North America are described, with notes on biology and relationship to other *Macrosiphum*: *Macrosiphum badium*, n. sp., from *Maianthemum* spp. (Liliaceae), *Macrosiphum claytoniae*, n. sp., from *Claytonia* spp. (Portulacaceae), *Macrosiphum holodisci*, n. sp., from *Holodiscus discolor* (Rosaceae), *Macrosiphum oregonense*, n. sp., from *Lysichitum americanum* (Araceae), *Macrosiphum vancouveriae*, n. sp., from *Vancouveria hexandra* (Berberidaceae), *Macrosiphum violae*, n. sp., from *Viola glabella* (Violaceae), *Macrosiphum willamettense*, n. sp., from *Spiraea douglasii* (Rosaceae), and *Macrosiphum wilsoni*, n. sp., from *Disporum* spp. (Liliaceae). In addition, notes on biology and taxonomy are provided for four previously described, but poorly known, species of *Macrosiphum*: *Macrosiphum insularis* (Pergande) (= *Macrosiphum yagasogae* Hottes, **new synonymy**), which has been found on *Streptopus amplexifolius* (Liliaceae) in Oregon, *Macrosiphum occidentalis*, which feeds on *Oemleria cerasiformis* (Rosaceae), *Macrosiphum tolmiea* (Essig), which has been found on *Mitella caulescens*, *Tellina grandiflora*, and *Tolmiea menziesii* (Saxifragaceae) in Oregon, and *Macrosiphum tuberculiceps* (Essig), which feeds on *Achlys triphylla* (Berberidaceae). A key to the North American *Macrosiphum* species feeding on Liliaceae is also presented.

Key Words: Oregon, Washington, British Columbia, Pacific Northwest, lilies, identification, aphids

There are 79 described species of *Macrosiphum* Passerini known in North America. Some of these can be serious pests of agricultural crops. Pest *Macrosiphum* include the potato aphid, *Macrosiphum euphorbiae* (Thomas), and the rose aphid, *Macrosiphum rosae* (L.). Besides these prominent, nearly worldwide pests, there are other species with a more regional impact. A few species, currently placed in the subgenus *Neocorylobium*, feed on hazelnuts, others feed on roses (*Macrosiphum impatientis* Williams, *Macrosiphum kiowa-*

nepus Hottes, *Macrosiphum pallidum* Oestlund), lilies (*Macrosiphum lilii* (Monell)), alfalfa (*Macrosiphum creelii* Davis), and geraniums (*Macrosiphum geranii* (Oestlund)). Many other species may occasionally be noted on various herbs and shrubs grown by homeowners as ornamentals. A set of characters useful for recognition of the genus *Macrosiphum* is presented in Jensen (1998).

Many of the North American species of *Macrosiphum* are poorly known, having been identified rarely or never since their

original descriptions. Other species have yet to be described. Extensive collecting in Oregon by the author and Gary L. Reed during the early 1990s led to the discovery of several undescribed *Macrosiphum* species, eight of which are sufficiently well understood to warrant their descriptions at this time. Some of these species previously had been collected by Cho-Kai Chan in British Columbia, Canada. In addition, collecting efforts in Oregon led to the rediscovery of four enigmatic previously described species whose identity and biology are covered in this paper.

Perhaps nowhere is the diversity of *Macrosiphum* greater than it is in western North America. The species described here represent only some of the apparently undescribed forms that I have seen from that region. Those not treated here are mostly known from one or a few small collections, and cannot be adequately characterized at the present time. Further collecting certainly will lead to discovery of heretofore missing morphs and life cycle information, allowing for other descriptions and information to be published.

The descriptions of the new species provided here are accompanied by notes on similar North American *Macrosiphum* species, descriptions of their biology, and notes on host plants. In practice, *Macrosiphum* spp. are easiest to identify based on their host plant and biology. For example, *Macrosiphum occidentalis* (Essig) is the only species so far known to be monoecious on *Oemleria cerasiformis* (Torr. and Gray ex Hook. and Arn.) Landon, and is one of only two species known to feed on the plant. Thus, although notes regarding the morphological comparison between species and a key to Liliaceae-feeding *Macrosiphum* are provided below, it should be remembered that the easiest and perhaps most reliable way to identify aphids such as these is to check the aphid species found on a particular host plant.

MATERIALS AND METHODS

The aphids used in this study were mounted on microscope slides in Canada balsam or Hoyer's medium, and observed under phase contrast microscopy. Terminology follows Miyazaki (1987) except that the base of antennal segment VI is referred to as antennal segment VIa, while the processus terminalis is referred to as antennal segment VIb, and the terms sensorium/sensoria are used rather than rhinarium/rhinaria. In the case of secondary sensoria on a.s. III and IV, the simple term sensoria is used, since the only sensoria found on these segments are secondary. Drawings were made by myself using a camera lucida. Abbreviations and terms used are as follows:

a.s. = antennal segment

a.s. VIa = basal part of antennal segment VI

a.s. VIb = apical part of antennal segment VI, often called the processus terminalis

u.r.s. = ultimate rostral segment

metatarsal II = second segment of the hind tarsus

siphunculus = cornicle

sensorium = rhinarium of authors

fundatrix/fundatrices = stem mother/s

aptera/apterae = wingless viviparous female/s

alata/alatae = winged viviparous female/s

ovipara/oviparae = egg-laying female/s

BMNH = The Natural History Museum, London

CNC = Canadian National Collection of Aphidoidea, Ottawa

OSU = Oregon State University, Corvallis

UCB = University of California, Berkeley

USNM = National Collection of Aphidoidea, Beltsville, MD

ASJ = the author's collection, Moses Lake, WA.

Ranges of measurements are provided in the descriptions for many body parts that are normally presented in aphid descriptions. There are also some ratios that may prove useful. The ideal aphid species de-

scription should include a table of actual measurements for all the important body parts of each specimen included in the description (e.g., Jensen 1998). This allows the reader to calculate the range of any ratio that might be of interest. Space limitations normally prevent presentation of such large volumes of raw data. Thus some important ratios are provided for comparison to other modern aphid descriptions, and others that may prove useful in the future are left out (for those who are interested in the raw measurement data, these can be obtained upon request from the author). One ratio that is used here for perhaps the first time is the length of a.s. VIa relative to a.s. V. Other antennal segments are compared to a.s. III simply to give a feel for relative lengths. The ratio of a.s. VIa/a.s. V appears to have some potential as a phylogenetically useful character. Several of the species discussed in this paper along with a few fern-feeding species are the only North American *Macrosiphum* that have this ratio about 0.4 or higher in their apterae. Apterae of many species similar to *M. rosae* have this ratio about 0.3 or less, and many endemic North American species seem to have a ratio of 0.3–0.4, but rarely more than 0.4. Exploration of the utility and meaning of this character must await a complete examination of the North American *Macrosiphum*.

Regarding the measurements, it should be noted that the length of the a.s. VIa includes the primary sensoria, the length of metatarsal II does not include the claws, the length of the cauda includes the soft part (as illustrated in Blackman and Eastop 1994), and the length of the body excludes the cauda.

Spinal and lateral tubercles can vary in shape and size. In the descriptions below, they are described as small to large and low to prominent. For example, some of these tubercles appear as low, but broad, circular, pale areas. These are referred to as large and low. Others may have a narrow base, and protrude far above the surrounding cu-

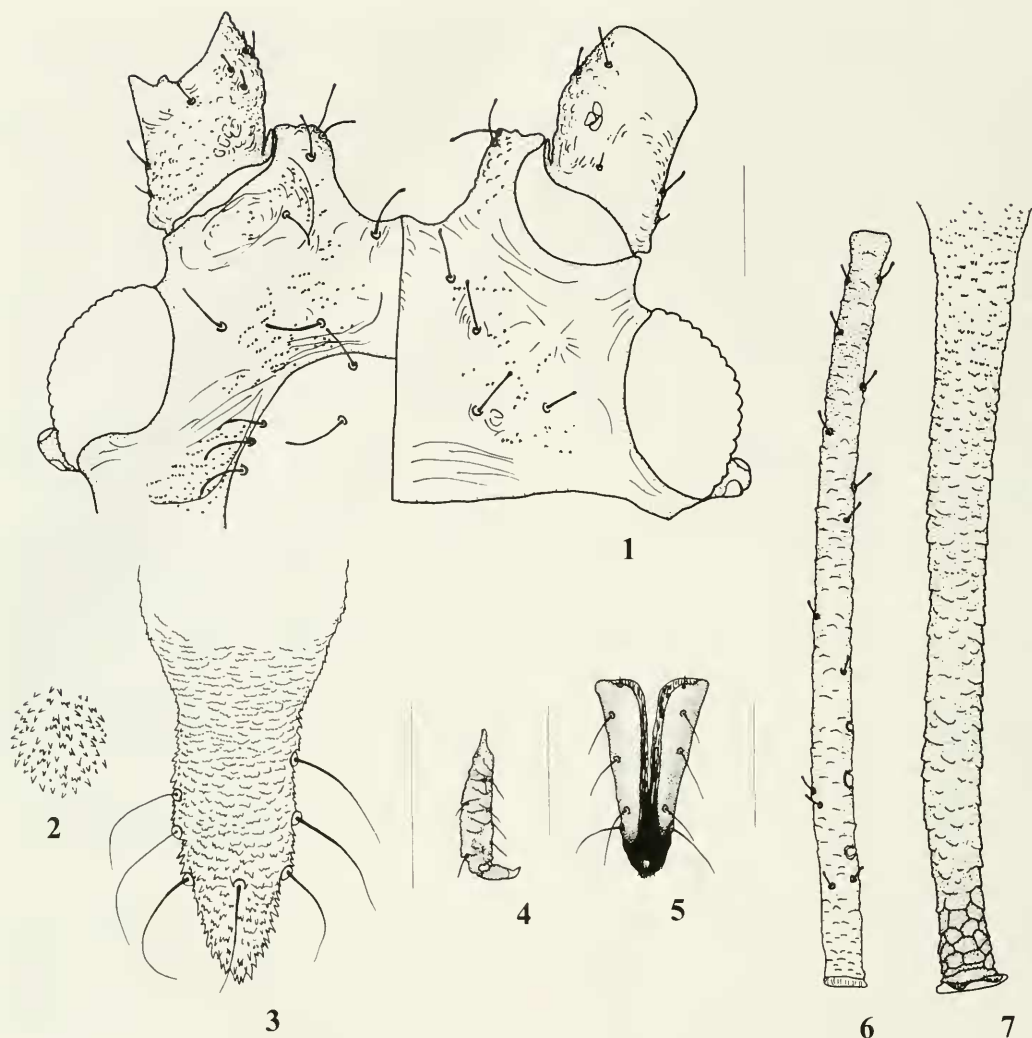
ticle. These are referred to as small and prominent.

It is important to note that, in the descriptions below, shapes of setae are described and drawn based on material that was not, or only slightly, treated with potassium hydroxide (KOH). The setal tips of *Macrosiphum* are fragile, apparently glandular in nature, and collapse when over-treated with KOH. Thus it is important to examine setae carefully in mounted specimens that were or may have been treated with KOH for evidence of collapsed membranous tips, and to be careful to use minimal KOH in specimen preparation. All scale bars in the illustrations equal 0.10 mm. Scale bars are placed to the right of most figures, except a single bar is placed to the right of all groups of a.s. III and siphunculus illustrations because these are always drawn to the same scale within a species; and, in a few cases a scale bar is placed between two structures when they are drawn to the same scale.

***Macrosiphum badium* Jensen,
new species
(Figs. 1–7)**

Fundatrices (2 specimens).—*Color*: When alive, dark green. When macerated, as in apterae, except pigmented areas paler so that dusky areas are pale, and many light brown areas are dusky.

Morphology: Body length 2.60–3.12 mm. A.s. III 0.62–0.67 mm long; a.s. IV 0.45–0.52 mm long, 0.69–0.78 times a.s. III; a.s. V 0.52–0.55 mm long, 0.81–0.83 times a.s. III; a.s. VIa 0.24–0.27 mm long, 0.46–0.48 times a.s. V; a.s. VIb 0.70–0.77 mm long, 1.12–1.16 times a.s. III; a.s. III with 0–2 sensoria; longest seta on a.s. III 0.02 mm long, 0.45 times basal width of segment; a.s. I spinulose/nodulose ventrally, mostly smooth dorsally, with 1–3 setae laterally. Dorsum of head smooth or with only a few spinules. Head without spinal tubercles. Antennal tubercles with 1–2 setae medially and 2 setae on ventral protuberance, longest seta 0.02–0.03 mm long and



Figs. 1-7. *Macrosiphum badium*. 1, Head of aptera. 2, Spinulation of ventral surface of cauda of aptera. 3, Cauda of aptera, dorsal surface. 4, Protarsal II of aptera. 5, U.r.s. of aptera. 6, A.s. III of aptera. 7, Siphunculus of aptera. All scale bars equal 0.10 mm.

0.54-0.74 times basal width a.s. III. Rostrum reaching to about mesocoxae, u.r.s. 0.13 mm long and 1.10-1.14 times metatarsal II, with 8 accessory setae. Setae on coxae and trochanters distinctly blunt to pointed. Metafemora 0.86-1.01 mm long. Mesotibiae with basal setae 0.02 mm long, apical setae 0.04 mm long. Metatibiae 1.56-1.81 mm long, with some dorsoapical setae much longer than similar setae on other tibiae. Metatarsal II 0.12 mm long. Abdominal tergum patchily sclerotic, especial-

ly toward spinal area. Segments II-V with small lateral tubercles. Siphunculi 0.60-0.78 mm long and 0.95-1.17 times a.s. III, with about 4 rows of reticulations. Cauda 0.30-0.35 mm long, with 6-8 setae, and ventral spinules moderately dense, mostly single, short and rounded; dorsal ornamentation composed of mostly tricuspid, tooth-like structures, several across width of cauda. Tergites VII and VIII occasionally with very low, indistinct spinal tubercles, longest of 5-7 setae on tergite VIII 0.03-0.04 mm

long and 0.96–1.31 times basal width a.s. III. Otherwise as in apterae.

Apterae (20 specimens measured).—*Color*: When alive, dark reddish brown, brick-colored. When macerated, head light brown, antennae brown, except base a.s. III pale, middle of a.s. III and IV lighter than a.s. V and VI. Rostrum entirely brown, with segment III and u.r.s. darker. Eyes with ocular tubercles and interfacetal spaces brown. Legs, including coxae and trochanters, uniformly dusky to light brown, except tips of tibiae and all of tarsi dark brown. Abdomen with tergum entirely pale to dusky throughout. Siphunculi dusky to brown except extreme base pale, becoming darkest apically. Cauda and genital plate dusky. Otherwise pale.

Morphology: Body length 2.27–3.14 mm. A.s. III 0.51–0.75 mm long; a.s. IV 0.44–0.69 mm long, 0.77–0.98 times a.s. III; a.s. V 0.44–0.58 mm long, 0.69–0.88 times a.s. III; a.s. VIa 0.17–0.27 mm long, 0.39–0.48 times a.s. V; a.s. VIb 1.00–1.25 mm long, 1.39–2.00 times a.s. III; a.s. III imbricated throughout, with 1–5 sensoria basally (Fig. 6); longest seta on a.s. III 0.02–0.03 mm long, 0.50–0.77 times as long as basal width of segment; a.s. I spinulose/nodulose dorsally and ventrally, most dense ventrally, with 1–3 setae laterally (Fig. 1); a.s. II with ornamentation limited almost entirely to medial and ventral surfaces, sometimes with a few spinules or minute imbrications dorsally, or sometimes the dorsum appearing wrinkled. Ventral part of head with spinules scattered over almost all its surface, including ventral protuberances of antennal tubercles; dorsum of head often with a pair of broad, indistinct rows of spinules extending from antennal tubercles to posterior row of setae, or at least a few spinules present on disc of head (Fig. 1). Head with low, indistinct spinal tubercles. Antennal tubercles large, diverging somewhat, with 2–4 setae medially and 1–2 setae ventrally, longest seta 0.03–0.04 mm long and 0.81–1.36 times basal width a.s. III; median prominence slightly devel-

oped (Fig. 1). Setae on head long, thin, with small capitate tips; setae on antennae minutely capitate to blunt. Rostrum reaching mesocoxae to slightly beyond, u.r.s. 0.12–0.16 mm long and 1.15–1.48 times metatarsal II, with 6–12 accessory setae. Prothorax with lateral tubercles. Dorsal thoracic setae slightly capitate to blunt, setae on sternum pointed, those on coxae and trochanters distinctly blunt. Femora with setae slightly capitate to blunt, with none dramatically longer than others; ornamentation extensive, composed of dense, small, spinulate imbrications, most dense anteriorly, extending over about apical three-fourths of segment; metafemora 0.77–1.13 mm long. Tibiae with basal setae blunt, becoming pointed apically; mesotibiae with basal setae 0.01–0.03 mm long, apical setae 0.03–0.04 mm long. Metatibiae 1.52–2.11 mm long. Tarsal segments I all with 3 setae; protarsal II with 2 or 3 pairs of dorsal setae (Fig. 4); metatarsal II 0.11–0.12 mm long. Abdominal tergum entirely strongly sclerotic, often corrugated. Segments II–V usually with small lateral tubercles. Dorsal setae with small capitate tips, longest setae on tergites II–IV 0.02–0.03 mm long; ventral setae pointed. Siphunculi 0.52–0.80 mm long and 0.86–1.13 times a.s. III, with about 5 rows of reticulations, with smooth and spinulate imbrications more basad (Fig. 7). Cauda 0.26–0.37 mm long, with 6–8 setae, and ventral spinules moderately dense, in groups of 1 and 2, sometimes 3 (Fig. 2); dorsal ornamentation composed of broad, ribbed imbrications, often fused to leave only 2 or 3 structures across width of cauda, or composed of several multicuspid tooth-like structures across width of cauda (Fig. 3). Tergites VII and VIII often with very low, indistinct spinal tubercles; longest of 8–13 setae on tergite VIII 0.04–0.06 mm long and 1.33–1.91 times basal width a.s. III. Middle pair of gonapophyses fused.

Alata, 1 specimen with underdeveloped wings, small ocelli and some apteriform appearance.—*Color*: When alive, unknown. When macerated, see below.

Morphology: The morphology and color when macerated will not be described in great detail, because the single specimen I have is an intermediate, without normally developed thoracic plates, abdominal sclerotization or pigmentation. Describing such a specimen would give little useful information. The only useful information this specimen offers is the number of sensoria on a.s. III (9), because it indicates that this species is probably one that has relatively few sensoria in the alatae.

Oviparae (12 specimens measured).—*Color:* When alive, dark reddish brown, brick-colored, some small specimens milky orangish yellow. When macerated, as in apterae.

Morphology: Body length 2.27–3.14 mm. A.s. III 0.51–0.66 mm long; a.s. IV 0.43–0.60 mm long, 0.78–0.97 times a.s. III; a.s. V 0.43–0.55 mm long, 0.72–0.87 times a.s. III; a.s. VIa 0.19–0.25 mm long, 0.40–0.49 times a.s. V; a.s. VIb 0.93–1.11 mm long, 1.52–1.96 times a.s. III; a.s. III with 1–5 sensoria basally; longest seta on a.s. III 0.02 mm long, 0.46–0.57 times basal width of segment; a.s. I with 1–3 setae laterally. Antennal tubercles large, diverging, with 2–3 setae medially and 1–3 setae ventrally; longest seta 0.03–0.04 mm long and 0.77–1.20 times basal width a.s. III. Setae on head long, thin, with small capitate tips; setae on antennae minutely capitate to blunt. Rostrum reaching to about mesocoxae, u.r.s. 0.13–0.15 mm long and 1.22–1.37 times metatarsal II, with 7–10 accessory setae. Setae on sternum blunt or pointed, those on coxae and trochanters distinctly blunt or pointed. Femora with setae slightly capitate to narrowly blunt; metafemora 0.76–1.05 mm long. Tibiae with basal setae slightly capitate to blunt, apical setae pointed; mesotibiae with basal setae 0.02 mm long, apical setae 0.03–0.04 mm long. Metatibiae 1.52–1.92 mm long, slightly swollen in basal one-half, with scent plaques covering basal one-half or a little more. Metatarsal II 0.10–0.12 mm long. Abdominal tergum usually membranous. Abdomi-

nal segments II–V often with small lateral tubercles. Longest seta on tergites II–IV 0.02–0.03 mm long. Siphunculi 0.55–0.75 mm long and 0.95–1.14 times a.s. III. Cauda 0.21–0.30 mm long, with 6–7 setae and dorsal ornamentation composed of very broad, ribbed imbrications, often fused to leave only 2 or 3 structures across width of cauda, or composed of several bi- or tricuspid tooth-like structures across width of cauda. Tergites VII and VIII sometimes with low, indistinct spinal tubercles; longest of 9–16 setae on tergite VIII 0.04–0.06 mm long and 1.20–2.09 times basal width a.s. III. Otherwise as in apterae.

Apterous and alate males (8 apterous and 2 alate specimens measured).—This description applies to the apterous males, which are the normal type of males in this species. The alate form is essentially the same as the apterous form, except for the normal thoracic development for flight muscles. The wings in both alate specimens are deformed, veins with thick and thin areas throughout. One specimen has a once-branched media, the other specimen media twice branched, second branch short, one wing with cubitus and medius with common stem, cubitus split, forming an elongate, pointed loop. Measurements for apterous and alate males were nearly identical, and so have been grouped together here.

Color: When alive, dark brown, sometimes dark reddish brown. When macerated, head and antennae entirely brown, except extreme base of a.s. III pale, and a.s. II much lighter than other segments, with diffuse darker regions around ocelli, when present. Rostrum entirely brown, with segment III and u.r.s. darker. Eyes with ocular tubercles and interfacetal spaces brown. Pro- and mesothoracic terga brown. Metathoracic tergum with a spinal horizontal brown band or cluster of spots, and muscle attachment plates extending most of width of posterior margin of tergum. Legs, including coxae and trochanters dusky to light brown, with tips of tibiae and all of tarsi dark brown. Abdominal terga I–V with spinal

brown patches or groups of spots that are sometimes fused among all tergites to form a broad, longitudinal band. Large pleural and spinal intersegmental muscle attachment plates brown. Abdominal segment I with a small lateral sclerite; segments II–IV with large lateral sclerites, segment V with a complete antesiphuncular sclerite; segment VI with large postsiphuncular sclerites which are usually connected by a spinal cross band; segments VII and VIII usually with complete brown cross bands. Siphunculi entirely brown, somewhat paler toward base. Cauda and claspers brown. Otherwise pale.

Morphology: Body length 1.86–2.84 mm. A.s. III 0.61–0.78 mm long; a.s. IV 0.57–0.76 mm long, 0.85–0.97 times a.s. III; a.s. V 0.51–0.66 mm long, 0.77–0.88 times a.s. III; a.s. VIa 0.17–0.25 mm long, 0.33–0.41 times a.s. V; a.s. VIb 1.00–1.28 mm long, 1.50–1.79 times a.s. III; a.s. III–V with sensoria scattered over their entire lengths, a.s. III with 29–51, a.s. IV with 16–29, and a.s. V with 12–21 secondary sensoria; longest seta on a.s. III 0.01–0.02 mm long, 0.42–0.60 times as long as basal width of segment; a.s. I with 1–3 setae laterally. Spinulation of head and a.s. I & II as in apterae. Dorsum of head somewhat wrinkled, especially surrounding ocellar regions, spinal tubercles absent or indistinct. Small ocelli sometimes present in normal positions. Antennal tubercles large, hardly diverging, with 1–3 setae medially and 1–2 setae ventrally; longest seta 0.02–0.03 mm long and 0.72–1.08 times basal width a.s. III. Setae on head and antennae blunt to pointed. Rostrum reaching to about mesocoxae, u.r.s. 0.13 mm long and 1.26–1.42 times metatarsal II, with 6–9 accessory setae. Thorax with pro- and mesothoracic terga entirely sclerotized, completely unmodified for flight apparatus; metathoracic tergum with pigmented plates described above. Dorsal setae thin, slightly capitate to blunt; sternal setae apparently blunt, with coxal and trochantal setae pointed. Femora with setae pointed or narrowly blunt, spi-

nulate ornamentation essentially as in apterae; metafemora 0.84–1.05 mm long. Tibiae with basal setae slightly capitate, apical ones pointed, mesotibiae with basal setae 0.01–0.02 mm long, apical setae 0.02–0.04 mm long. Metatibiae 1.62–2.04 mm long. Metatarsal II 0.10–0.11 mm long. Abdominal tergum with pigmented sclerotized areas as described above, otherwise membranous. Lateral tubercles absent. Dorsal setae moderately long, blunt, ventral setae pointed; longest seta on tergites II–IV 0.02–0.03 mm long. Siphunculi 0.44–0.54 mm long and 0.68–0.75 times a.s. III. Cauda 0.18–0.22 mm long, with 6–8 setae, ventral spinules moderately large, dense, with rounded or pointed tips. Tergites VII and VIII without spinal tubercles; spinal areas of tergites anterior to siphunculi usually with spinules surrounding spinal setae, often with very few or none on tergites I–II; longest of 7–11 setae on tergite VIII 0.04–0.05 mm long and 1.17–1.67 times basal width a.s. III. Claspers normal, with very narrow gap between them anteriorly. Otherwise essentially as in apterae.

Type material.—*Holotype aptera:* Oregon, Benton County, McDonald State Forest, ex *Maianthemum racemosa* (L.) Link, 23 August 1991, A.S. Jensen, deposited in the USNM.

Paratype apterae: 1 Oregon, Lincoln County, Waldport, ex *Maianthemum dilatatum* (Wood) Nels. and Macbr., 23 September 1991, A.S. Jensen (OSU); 1 Oregon, Benton County, McDonald State Forest, ex *Maianthemum stellata* (L.) Link, 2 October 1992, A.S. Jensen (CNC); 2 same data except the date: 11, 28 September 1993 (1 BMNH, 1 USNM).

Paratype males: 1 alate male Oregon, Benton County, McDonald State Forest, ex *M. stellata*, 14 October 1994, A.S. Jensen (USNM); 4 apterous males same data as alate male (1 USNM, 1 CNC, 1 BMNH, 1 OSU).

Paratype oviparae: 4 Oregon, Benton County, McDonald State Forest, ex *M. stel-*

lata, 3 October 1993, A.S. Jensen (1 USNM, 1 CNC, 1 BMNH, 1 OSU).

Additional material: Many apterae, a few males and oviparae, and the two fundatrices from Oregon, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species is monoecious, holocyclic, feeding on *Maianthemum racemosa*, *M. stellata* and *M. dilatatum* (Liliaceae). Egg hatch occurs during March in Oregon's Willamette Valley as the plants are unfolding. Reproduction continues until June, when the apterae present at the time mature, and enter what appears to be a reproductive diapause through the summer. These apterae settle either among the fruits, when present, or on the lower leaves. Reproduction begins again in September, usually on the lower or most yellow leaves. The apterae that survive the summer give birth to oviparae and males. Eggs are laid below the surface of the soil along the plant stem. Males have only been observed in nature twice, despite many sincere efforts. The first apterous male was collected on the outside of a cloth bag enclosing a plant that had several oviparae on it. In 1994, males were quite easy to find throughout my normal collecting areas in McDonald State Forest. Some plants had several males, both alate and apterous. This occurred even though populations of the aphid overall were not dramatically higher than other years.

This species is known from Washington and Oregon.

Remarks.—This species is easily separated from most other *Macrosiphum* by the presence of scattered spinules on the dorsum of the head. Other unusual characters include its brown color and the often slightly pigmented tergum.

A species with which *M. badium* might be confused is *M. insularis*, which feeds on *Maianthemum* and *Streptopus*. The latter species and *M. badium* can be separated based on the tarsal lengths (metatarsal II longer than u.r.s. in *M. insularis*, shorter than u.r.s. in *M. smilacinae*), cauda struc-

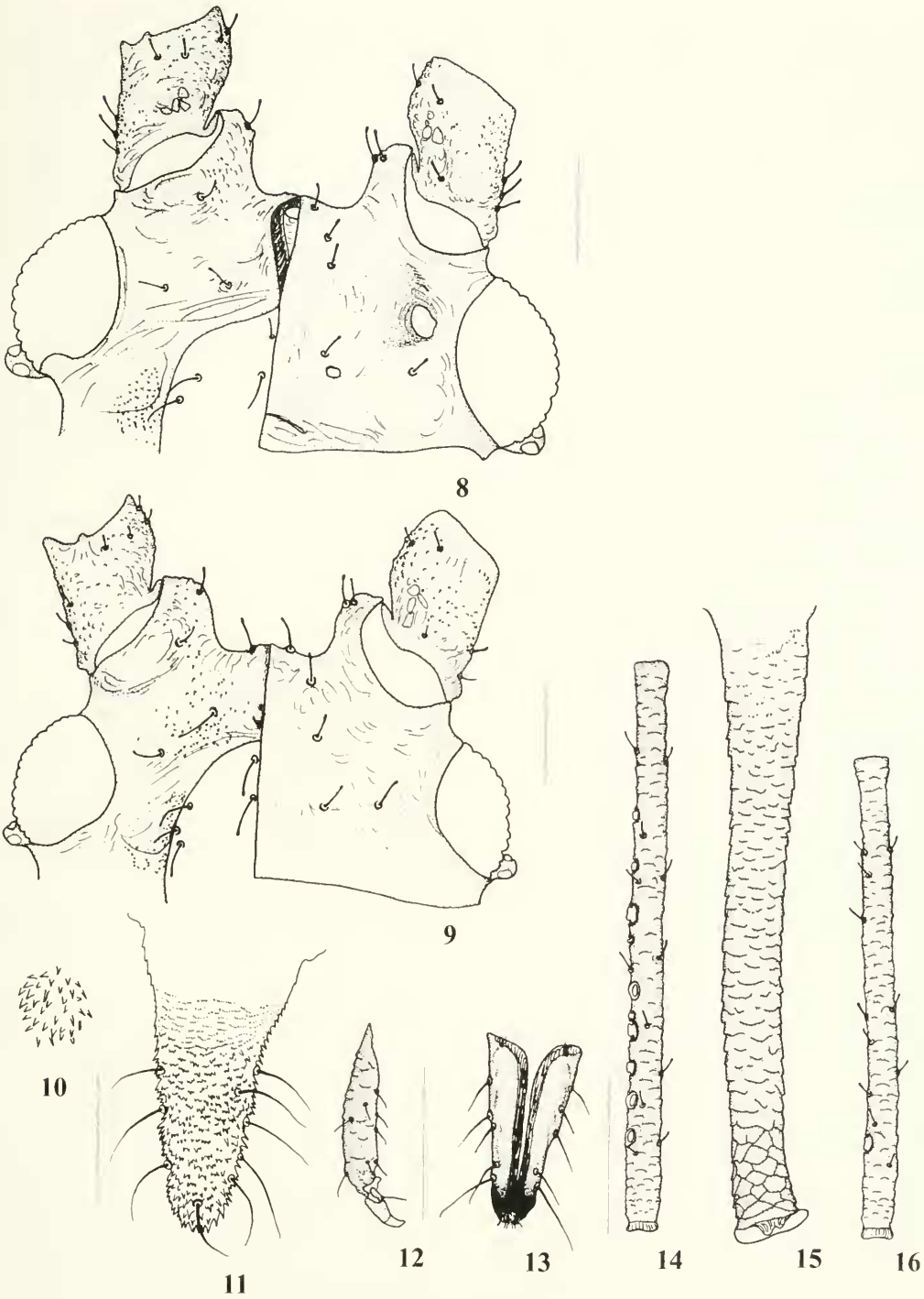
ture (ventral spinules often doubled in *M. badium*, rarely so in *M. insularis*), and spinulation of the head (*M. insularis* lacks dorsal spinules). This species differs from the other *Maianthemum*-feeding *Macrosiphum* species in North America, *M. pechumani*, by its smaller size, relatively long a.s. VIa (about 0.3 in *M. pechumani*), protarsal II normally with 3 pairs of dorsal setae (2 pairs in *M. pechumani*), and many other characters. In general, *M. pechumani* looks like *M. rosae*, a species very different from *M. badium*. See also the key to lily-feeding *Macrosiphum* at the end of this paper.

The name of this species was derived from the Latin adjective *badius*, which means chestnut-brown or reddish brown. The name of *M. badium* refers, therefore, to the reddish brown color of the apterae.

***Macrosiphum claytoniae* Jensen,
new species
(Figs. 8–16)**

Apterae (20 specimens measured).—*Color:* When alive, adults superficially appearing dark reddish or greenish brown, but dorsum entirely brown, covering the normal reddish or green pigment found in *Macrosiphum*. Nymphs with purplish or bluish gray dusting of wax. When macerated, head and antennae entirely brown, with head, a.s. I, II and extreme base of a.s. III lighter brown than remainder of antenna. Rostrum entirely brown, with base somewhat paler. Thorax, including legs, entirely brown, with tips of tibiae and all of tarsi darker. Abdomen entirely brown dorsally, more or less concolorous throughout, including siphunculi, cauda and anal plate. Other parts pale.

Morphology: Body length 1.81–2.65 mm excluding cauda. A.s. III 0.41–0.55 mm long; a.s. IV 0.34–0.50 mm long, 0.77–0.98 times a.s. III; a.s. V 0.34–0.44 mm long, 0.74–0.97 times a.s. III; a.s. VIa 0.17–0.24 mm long, 0.48–0.59 times a.s. V; a.s. VIb 0.81–1.02 mm long, 1.82–2.38 times a.s. III; a.s. III imbricated, with 0–1 sensorium basally (Fig. 16); longest seta on a.s. III 0.02 mm long, 0.46–0.75 times basal



Figs. 8–16. *Macrosiphum claytoniae*. 8, Head of alata. 9, Head of aptera. 10, Spinulation of ventral surface of cauda of aptera. 11, Cauda of aptera, dorsal surface. 12, Protarsal II of aptera. 13, U.r.s. of aptera. 14, A.s. III of alata. 15, Siphunculus of aptera. 16, A.s. III of aptera. All scale bars equal 0.10 mm.

width of segment; a.s. I spinulate/denticulate over most of ventral surface and with a patch of spinules laterally and dorsally in middle, with 2–4 setae laterally; a.s. II with many spinules/denticles ventrally and a few dorsally. Ventral surface of head spinulate, extending in two longitudinal rows from antennal tubercles almost to rear of head, and with a pair of spinulate patches at base of mouthparts (Fig. 9). At least one small spinal tubercle often present on head. Antennal tubercles large, diverging, sometimes nearly parallel (Fig. 9), with 2–3 setae medially and 1–2 ventrally, longest seta 0.02–0.04 mm long and 0.69–1.27 times basal width a.s. III; median prominence distinct. Setae on head long, thin, with small capitate tips; setae on antennae short, thin, capitate. Rostrum reaching to mesocoxae, u.r.s. 0.12–0.14 mm long and 1.01–1.25 times metatarsal II, with 6–10 accessory setae. Prothorax usually with small lateral tubercles. Setae on tergum thin, with small capitate tips; setae on sternum and coxae pointed, trochantal setae more or less blunt. Femora with a mixture of pointed and blunt setae; ornamentation extensive, very rough dorsally, with numerous spinules and small spinulate imbrications scattered over distal $\frac{1}{2}$ or more of anterior side, with much fewer on posterior, limited mainly to dorsal, distal $\frac{1}{2}$ of each femur; ornamentation more extensive on metafemur, extending further basad; metafemora 0.76–1.00 mm long. Tibiae with basal setae minutely capitate; mesotibia with basal seta 0.02–0.04 mm long, apical setae 0.03–0.04 mm long; metatibiae 1.35–1.87 mm long. Tarsal segments I all with 3 setae, protarsal II with 2 or 3 pairs of dorsal setae (Fig. 12); metatarsal II 0.11–0.13 mm long. Abdomen with tergum very strongly sclerotic, and usually heavily corrugated. Some of segments II–V with small, low lateral tubercles. Dorsal setae thin, blunt, longest seta on tergites II–IV 0.02 mm long; ventral setae pointed. Siphunculi 0.46–0.62 mm long and 1.01–1.37 times a.s. III, with about 5 rows reticulations (Fig. 15). Cauda 0.17–0.27 mm long, with 7–8

setae, and with ventral spinules large, long, pointed and relatively sparse, mostly single (Fig. 10); dorsal ornamentation composed mostly of sharply tricuspid tooth-like structures, about 8 across width of cauda (Fig. 11). Tergites VII and VIII usually with 1 or 2 small, low spinal tubercles, longest of the 7–10 setae on tergite VIII 0.03–0.06 mm long and 1.04–1.85 times basal width a.s. III. Middle pair of gonapophyses fused.

Alatae (15 specimens measured).—*Color*: When alive, dark brownish red or green. When macerated, head and all of antennae brown, base of a.s. III lighter. Rostrum entirely brown, tip of u.r.s. darker. All thoracic plates dark brown. Legs entirely dusky to brown; bases of femora more or less pale, becoming dusky and then brown apically, tibiae light brown basally and in middle, dark brown apically. Abdomen with typical lateral sclerites, intersegmental muscle attachment plates, which are more extensive than the muscle attachment points, and ante- and postsiphuncular sclerites brown; tergites I–III and sometimes also IV–VI with additional spinal brown spots or complete cross bands; tergites VII and VIII with complete cross-bands. Siphunculi, cauda and genital plate brown. Other parts pale.

Morphology: Body length 2.07–2.56 mm. A.s. III 0.42–0.63 mm long; a.s. IV 0.35–0.52 mm long, 0.74–0.98 times a.s. III; a.s. V 0.33–0.52 mm long, 0.70–0.93 times a.s. III; a.s. VIa 0.18–0.26 mm long, 0.47–0.58 times a.s. V, a.s. VIb 0.87–1.06 mm long, 1.56–2.13 times a.s. III; a.s. III with 7–12 sensoria scattered in a row over most of its length (Fig. 14); longest seta on a.s. III 0.02 mm long, 0.5–0.73 times basal width of segment; a.s. I with 2–4 setae laterally. Ventral surface of head with spinules on antennal tubercles, less extensive than in apterae, but with a strong patch of spinules posteriorly on each side (Fig. 8). Small spinal tubercles usually present on head. Setae on head and antennae blunt. Rostrum reaching middle of mesothorax, u.r.s. 0.12–0.14 mm long and 1.03–1.24 times metatarsal II, with 7–10 accessory setae. Thoracic plates

normal. Dorsal and sternal setae blunt, coxal and trochantal setae pointed. Femora with setae finely blunt to pointed, ornamentation very extensive, most dense anteriorly, but also posteriorly, covering about apical 2/3 of femur; metafemora 0.75–0.99 mm long. Tibiae with basal setae blunt; mesotibiae with basal setae 0.02 mm long, apical setae 0.03–0.04 mm long; metatibiae 1.41–1.85 mm long. Metatarsal II 0.11–0.13 mm long. Abdominal tergum membranous, except pigmented sclerites mentioned above. Segments II–V usually with small lateral tubercles. Dorsal setae slightly blunt to pointed, longest seta on tergites II–IV 0.02 mm long. Siphunculi 0.42–0.56 mm long and 0.75–1.26 times a.s. III, with 5–8 rows of reticulations, similar to apterae. Cauda 0.17–0.25 mm long, with 7–9 setae, and with ventral spinules moderately dense, long, pointed, essentially all single; dorsal ornamentation composed of double and triple, blunt and pointed tooth-like structures, about 6 across width of cauda in middle. Tergites VII and VIII often with at least 1 small, low spinal tubercle; longest of the 7–10 setae on tergite VIII 0.03–0.05 mm long and 0.93–1.50 times basal width a.s. III. Middle pair of gonapophyses fused. An illustration of the siphunculus of an alata is not provided because it would be essentially identical to the apterae. Otherwise as in apterae.

Type material.—*Holotype aptera*: Oregon, Benton County, McDonald State Forest, ex *Claytonia sibirica* L., 15 April 1994, A.S. Jensen, deposited in the USNM.

Paratype apterae: 1 same data as holotype (USNM); 1 same data as the holotype except the date: 9 September 1991 (USNM); 5 Oregon, Multnomah County, Multnomah Falls, ex *C. sibirica*, 13 May 1992, A.S. Jensen (1 USNM, 3 CNC, 1 BMNH); 4 Oregon, Benton County, Cordley Hall Lab, ex *C. sibirica*, 7 January 1993, A.S. Jensen (2 BMNH, 2 OSU); 1 Canada, British Columbia, Vancouver, UBC Campus, ex *C. sibirica*, 29 May 1993, A.S. Jensen (OSU).

Paratype alatae: 1 Oregon, Benton County, Cordley Hall Lab, ex *C. sibirica*, 20 January 1993, A.S. Jensen (CNC); 2 same data except the date: 7 January 1993 (1 OSU, 1 BMNH); 1 Canada, British Columbia, Vancouver, UBC Campus, ex *C. sibirica*, 29 May 1993, A.S. Jensen (USNM).

Additional material.—Many apterae and alatae from western Oregon and British Columbia, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species appears to be entirely anholocyclic. Hosts include *Claytonia sibirica* L. (Portulacaceae) and two other unidentified *Claytonia* spp. The former is the most important host. The aphid feeds throughout the year on its hosts, reproducing whenever temperatures allow. During the spring of 1992, normal apterae were found 29 February on a plant that had overwintered. Anholocycly was suspected at this time, but was not proven until the winter of 1993 when sexuales were not recovered from field colonies and did not develop in the laboratory. Also during this winter there was a 15 cm snow fall followed by temperatures as low -8°C . During the last day that snow lay on the forest floor, aphids were observed under the snow in cavities formed by overlying fern fronds. Temperatures at the time were about 2°C , and aphids were capable of sluggish movement when prodded.

This species' biology is unusual not only because it is anholocyclic, but also because its most important host plant is not a perennial. In McDonald State Forest, Benton County, Oregon, most *M. sibirica* plants germinate from seeds in the fall and winter, often becoming very dense as they flower in spring and early summer. By late summer, most plants have died, leaving only a few very robust ones in drier sites, and a few plants of various sizes near streams. Thus each year this aphid species experiences a very severe population reduction as its plants die out. It often survives the dry season on plants near streams or seeps. It must remain on these surviving plants until

mid winter, when the plants are getting larger, and preparing to flower. In some years, this species is abundant and widespread in McDonald State Forest in late winter and spring.

This aphid is known from British Columbia and Oregon, and I recently tentatively identified specimens from Washington as this species. The distribution of *C. sibirica* includes the Pacific coast states and provinces from Alaska to southern California, east to Montana and Utah (Hitchcock et al., 1964). The aphid's distribution may coincide with this, but I suspect it is limited primarily to the area west of the Cascade Mountains, where winters are milder and wetter.

Remarks.—The apterae of this species are easily separated from other *Macrosiphum* by the entirely pigmented dorsum. Alatae are less clearly separable, but the pigmented cauda and more extensive dorsal abdominal pigmentation serve to separate most specimens. The only other North American *Macrosiphum* known from any Portulacaceae is *Macrosiphum euphorbiae* (Thomas), which has a pale dorsum and at least partly pale siphunculi.

***Macrosiphum holodisci* Jensen,
new species**
(Figs. 17–24)

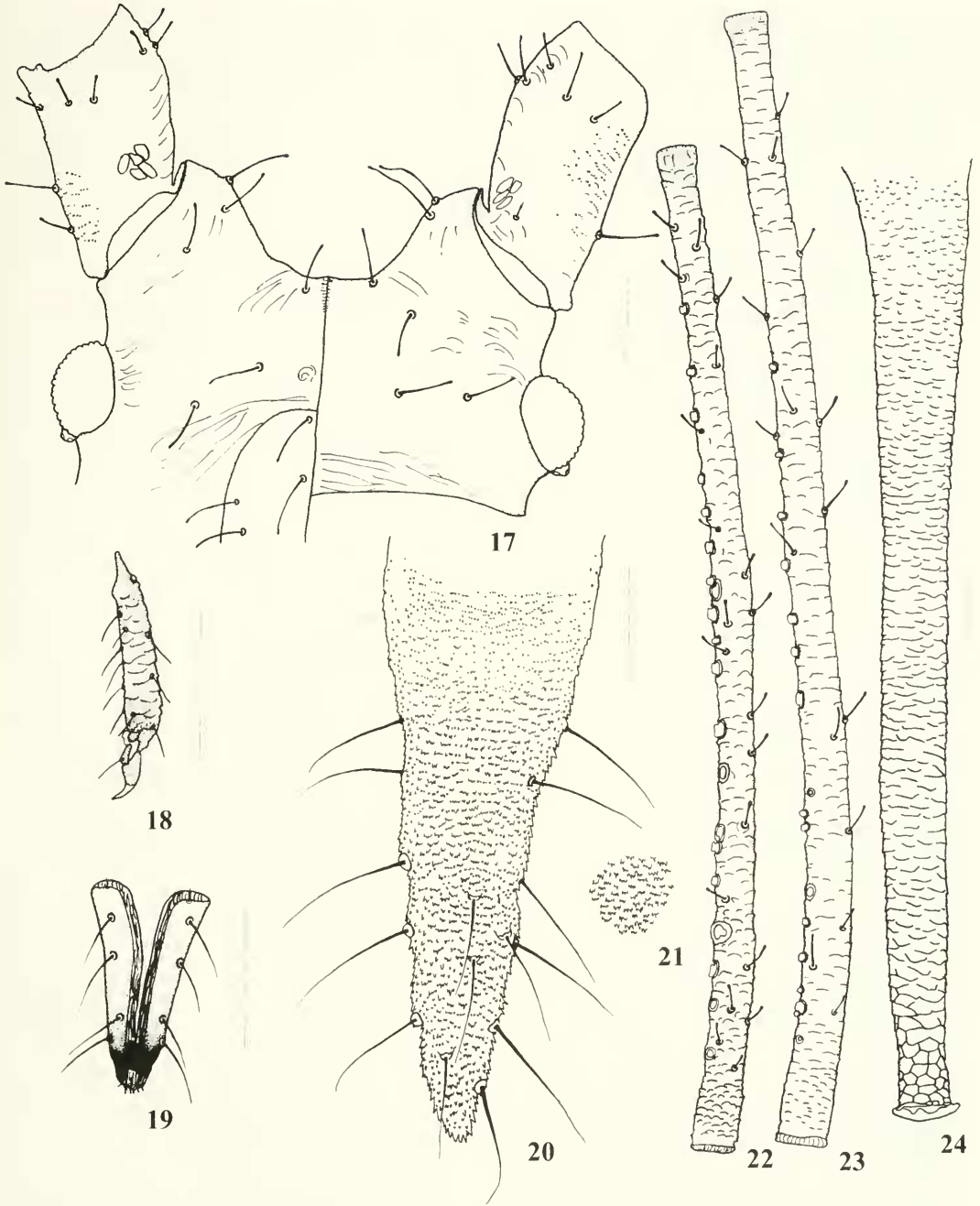
Fundatrices (2 specimens measured).—*Color*: When alive, first instar yellow with dark scleroites dorsally. Second instar nymphs also yellow, with smaller dark scleroites. Other nymphal instars: unknown. Adults white. Color when macerated, as in apterae.

Morphology: Body length 2.6 mm. A.s. III 0.97–0.99 mm; a.s. IV 0.65–0.69 mm long, 0.67 times a.s. III; a.s. V 0.78–0.80 mm long, 0.81–0.83 times a.s. III; a.s. VIa 0.30–0.32 mm long, 0.38–0.41 times a.s. V; a.s. VIb 0.98–1.03 mm long, 1.01–1.03 times a.s. III; a.s. III with 2 very small sensoria; longest seta on a.s. III 0.50 to 0.91 times basal width of the segment; a.s. I with 1–2 setae laterally. Ventral surfaces of head,

a.s. I, and sometimes a.s. II with a few spinules. Antennal tubercles with 2 setae medially and 0–2 ventrally, with longest seta 0.05–0.07 mm long and 1.06–1.73 times basal width a.s. III; median prominence absent. Rostrum with u.r.s. 0.12 mm long and 0.81–1.02 times metatarsal II, very broad at base, with 6–7 accessory setae. Femoral ornamentation similar to apterae but less extensive; metafemur 1.09–1.11 mm long. Metatibia 2.08–2.09 mm long. Metatarsal II 0.12 mm long. Abdomen with tergum membranous. Narrow, prominent lateral tubercles present on some segments. Dorsal setae on tergites II–IV 0.03–0.05 mm long. Siphunculi 1.00–1.06 mm long and 1.03–1.18 times a.s. III, with 3–6 rows reticulations apically, the remainder with very faint imbrications. Cauda 0.45–0.47 mm long, with 16–17 setae. Tergites VII and VIII without spinal tubercles, longest of the 8–9 setae on tergite VIII 0.07 mm long, 1.59–2.36 times basal width a.s. III. Otherwise more or less as in apterae.

Apterae (13 specimens measured).—*Color*: When alive, nymphs and adults white. Color when macerated, entirely pale except tips of tibiae and tarsi dusky, tip of rostrum brown and antennal joints dark brown including area of primary sensorium on a.s. VI.

Morphology: Body length 2.05–3.41 mm. A.s. III 0.88–1.21 mm; a.s. IV 0.73–1.27 mm long, 0.80–1.12 times a.s. III; a.s. V 0.79–1.46 mm long, 0.84–1.33 times a.s. III; a.s. VIa 0.26–0.48 mm long, 0.29–0.38 times a.s. V; a.s. VIb 1.26–2.34 mm long, 1.34–2.55 times a.s. III; a.s. III lightly imbricated, with 4–14 sensoria on a.s. III of more or less normal width and shape (~0.02 mm) to small, spherical projections (0.004 mm wide) (Fig. 17); longest seta on a.s. III 0.03–0.04 mm long, 0.68–0.88 times basal width of segment; ventral surfaces of a.s. I and II and dorsum of I with spinules (Fig. 17); a.s. I with 1–5 setae laterally. Ventral surface of head smooth except for patches of small spinules posteriorly (Fig. 17). Small, prominent, spinal tubercles



Figs. 17-24. *Macrosiphum holodisci*. 17, Head of aptera. 18, Protarsal II of aptera. 19, U.r.s. of aptera. 20, Cauda of aptera, dorsal surface. 21, Spinulation of ventral surface of cauda of aptera. 22, A.s. III of alata. 23, A.s. III of aptera. 24, Siphunculus of aptera. All scale bars equal 0.10 mm.

sometimes present on head. Antennal tubercles large, with 2 or 3 setae apically, and 1 or 2 setae ventrally, longest setae on antennal tubercles 0.05–0.07 mm long, 1.25–1.87 times basal width a.s. III; median prominence absent. All dorsal setae distinctly capitate, ventral setae broadly blunt except those on rostrum and a.s. VI, which are pointed. Eyes unusually small relative to size of head (Fig. 17). Rostrum reaching mesocoxae, u.r.s. 0.13–0.15 mm long and 0.97–1.16 times metatarsal II, with 6–11 accessory setae. Prothorax with prominent lateral tubercles. Dorsal setae capitate, sternal and coxal setae pointed; trochanters with slightly capitate setae. Femora with setae capitate, no ventral ones dramatically longer than others nearby; at least distal one half of femora with scattered ornamentation, almost equally distributed anteriorly and posteriorly, on hind femur extending nearly to base; metafemora 1.08–1.64 mm long. Tibiae with basal setae slightly capitate; mesotibiae with basal setae 0.02–0.04 mm long, apical setae 0.03–0.04 mm long; metatibiae 2.20–3.28 mm long. All first tarsal segments with 3 setae; protarsal II with 2 pairs of dorsal setae (Fig. 18); metatarsal II 0.12–0.14 mm. Abdominal tergum variable, most specimens with completely sclerotized tergum, some with only lateral sclerites and small irregular spinal patches of sclerotization. Thin, often very long lateral tubercles usually present on segments II–V, but sometimes absent or low on some segments. Dorsal setae capitate, those on tergite VIII less so than on other tergites, longest seta on tergites II–IV 0.04–0.05 mm long; ventral setae pointed. Siphunculi 0.89–1.39 mm long and 0.93–1.26 times a.s. III, with 6–10 rows reticulations apically, parts more basal with imbrications that appear ribbed (Fig. 24). Cauda 0.35–0.50 mm in length, with 13–19 setae; ventral spinules very dense, mostly in groups of 3 or 4 (Fig. 21); dorsal ornamentation composed of small multicuspid structures, about 15 across width of cauda (Fig. 20). Tergite VIII sometimes with small spinal

tubercles, longest of the 8–12 seta on tergite VIII 0.06–0.09 mm long and 1.64–2.33 times basal width a.s. III. Middle pair of gonapophyses fused.

Alatae (7 specimens measured, all with broken antennae).—*Color*: When alive, white. Color when macerated, as in fundatrix, except for dusky rings around lateral ocelli, and cubital and anal veins bordered in brown.

Morphology: Body length 2.51–3.01 mm. A.s. III 0.94–1.13 mm long; a.s. IV 0.98–1.34 mm long, 0.97–1.28 times a.s. III; a.s. V 1.21–1.28 mm long, 1.26–1.27 times a.s. III; no specimens available have intact a.s. VI; a.s. III with 15–23 sensoria (Fig. 22); longest setae on a.s. III 0.02–0.03 mm long, 0.73–0.86 times basal width of segment. Head without spinal tubercles. Antennal tubercles with longest setae 0.04 mm long, 1.14–1.23 times basal width a.s. III. Rostrum with u.r.s. 0.13–0.14 mm long and 1.00–1.13 times metatarsal II, with 7–8 setae. Thoracic plates normal. Prothorax sometimes with lateral tubercles. Dorsal and trochantal setae blunt, ventral and coxal setae pointed. Femora with small-capitate setae; metafemora 1.27–1.43 mm long. Metatibiae 2.56–2.89 mm long. Metatarsal II 0.13–0.14 mm. Abdominal tergum membranous except for muscle attachment plates and faint lateral sclerites. Small lateral tubercles present on at least some segments II–V. Dorsal setae small-capitate except on tergite VIII where they are pointed, as are the ventral setae. Siphunculi 0.95–1.06 mm long and 0.91–1.10 times a.s. III, with about 5–7 rows reticulations. Cauda 0.30–0.44 mm in length, with 14–18 setae, and with ventral spinules very dense, small, in groups of 3–5. Tergite VIII with 7–9 setae, without spinal tubercles. Otherwise as in apterae.

Oviparae (8 specimens measured).—*Color*: When alive, white. Color when macerated, as in fundatrices.

Morphology: Body length 1.85–3.08 mm. A.s. III 0.87–1.03 mm long; a.s. IV 0.88–1.15 mm long, 0.94–1.11 times a.s.

III; a.s. V 1.00–1.24 mm long, 1.05–1.15 times a.s. III; a.s. VIa 0.36–0.40 mm long, 0.31–0.39 times a.s. V; a.s. VIb 1.97–2.19 mm long, 2.06–2.41 times a.s. III; a.s. III with 1–5 sensoria basally, some of which are very small. Rostrum with u.r.s. 0.12–0.14 mm long and 1.03–1.19 times metatarsal II, with 6–9 accessory setae. Head without spinal tubercles. Metafemora 1.18–1.41 mm long. Metatibiae 2.28–2.88 mm long. Metatarsal II 0.12–0.13 mm. Abdominal tergum membranous except for sclerotized intersegmental muscle attachment plates. Many abdominal segments with small lateral tubercles. Dorsal setae slightly capitate, pointed on tergite VIII. Siphunculi 1.01–1.28 mm long and 1.10–1.24 times a.s. III, with about 5 rows reticulations. Cauda 0.29–0.33 mm long, with 15–19 setae. Tergite VIII without spinal tubercles, with 7–10 setae. Otherwise more or less as in apterae.

Apterous males (3 specimens measured).—*Color*: When alive, very pale green. Color when macerated, a.s. III dark brown, except at extreme base; a.s. IV dusky to light brown, with extreme base and apex dark brown; a.s. V dark brown at extreme base, remainder of basal one half dusky, apical one-half darkening to brown; a.s. VI brown, with middle of VIa somewhat lighter. Tip of u.r.s. brown. Tips of femora and bases of tibiae dusky to brown, front legs darker than middle, which are darker than hind legs. Tibiae with apical parts brown. Tarsi all brown.

Morphology: Body length 1.96–2.23 mm. A.s. III 0.80–0.89 mm long; a.s. IV 0.81–0.86 mm long, 0.93–1.05 times a.s. III; a.s. V 0.92–0.97 mm long, 1.07–1.14 times a.s. III; a.s. VIa 0.32–0.34 mm long, 0.34–0.35 times a.s. V; a.s. VIb 1.85–1.94 mm long, 2.08–2.41 times a.s. III; a.s. III with 36–44 sensoria; a.s. IV with 19–29 sensoria; a.s. V with 17–19 secondary sensoria; longest setae on a.s. III 0.02–0.03 mm long, 0.7–0.8 times basal width of that segment; longest setae on antennal tubercles 1.23–1.57 times that width. Head with-

out spinal tubercles, but faint, small vestigial ocelli sometimes present. Antennal tubercles with a few small spinules, 1 seta ventrally, and 2 setae medially. Dorsal setae narrowly blunt, all others pointed. Eyes not appearing as small as in the apterae (Fig. 17). Rostrum almost reaching hind coxae, u.r.s. 0.12–0.13 mm long and 1.04–1.09 times metatarsal II, with 8–9 accessory setae. Thoracic tergum membranous. Dorsal setae broadly blunt, ventral setae and those on coxae and trochanters pointed. Femora with setae narrowly blunt; metafemora 1.07–1.12 mm long. Tibiae with basal setae narrowly blunt; metatibiae 2.26–2.32 mm long. Metatarsal II 0.12 mm long. Abdominal tergum membranous except lateral sclerites and small dorsal sclerotized patches. Many segments with small, low to prominent lateral tubercles. Dorsal setae slightly capitate, with those on tergite VII nearly pointed, and those on tergite VIII finely pointed. Siphunculi 0.59–0.63 mm long and 0.69–0.78 times a.s. III, with about 4 rows reticulations. Cauda 0.24–0.26 mm long, with 11–15 setae. Tergite VIII with 6 setae. Claspers of normal aphid type. Otherwise as in apterae.

Type material.—*Holotype aptera*: Oregon, Benton County, McDonald State Forest, ex *Holodiscus discolor* (Pursh) Maxim., 30 August 1991, A.S. Jensen, deposited in the USNM.

Paratype fundatrices: 2 with same data as the holotype except the date: 4 April 1992 (1 BMNH, 1 USNM).

Paratype apterae with same data as the holotype except the dates: 2 29 May 1992 (ASJ); 1 9 September 1991 (BMNH); 1 25 August 1991 (OSU); 2 16 September 1991 (OSU). 7 California, Yountville, ex *H. discolor* (Pursh) Maxim., 23 June 1931, P.S.B. (UCB); 2 California, 11 mi. north of Crescent City, ex *H. discolor*, 6 June 1941, J. Schuh (UCB).

Paratype alatae with same data as the holotype except the date: 6 29 May 1992.

Paratype oviparae with same data as the holotype except the dates: 3 16 September

1991 (1 ASJ, 1 BMNH, 1 USNM); 2 1 October 1991 (ASJ); 2 10 October 1991 (1 CNC, 1 OSU).

Paratype apterous males with same data as the holotype except the dates: 1 1 October 1991 (ASJ); 2 10 October 1991 (1 BMNH, 1 USNM).

Biology and distribution.—*Macrosiphum holodisci* was originally discovered on its host, *Holodiscus discolor* (Pursh) Maxim. (Rosaceae), in the forests west of Corvallis, Oregon. Several specimens were collected during the fall of 1991, including some oviparae and males. Several oviparae were enclosed in the field in a thin cloth bag, and allowed to oviposit on the leaves and branches within the bag. The bag and its contents remained undisturbed throughout the winter, and the spring generations were reared within the bag until May, 1992. Interestingly, the oviparae laid their eggs on the leaves, twigs, buds, etc., yet the first instar nymphal fundatrices found each other upon hatching, and developed in tight clusters on the buds and young leaves through their second instar. This is in contrast to many other *Macrosiphum*, whose nymphal fundatrices tend to be more dispersed. The early instar fundatrix of this species is also unusual in that it has pairs of dark sclerites on the abdominal tergites, and because it is a striking yellow color, while the adult is white.

Since 1992 this species has been seen only once in the forests near Corvallis. In 1994 several early instar fundatrices were found. These were caged in a cloth bag to protect them from predators, but they were instead killed by a fungus. Thus considerable collecting effort has shown this species to be quite rare in the Corvallis area, and it has never been found elsewhere in Oregon despite extensive collecting from *H. discolor*. Several specimens were borrowed from Washington State University, Prosser, which had been collected in Klickitat and Kittitas counties, Washington. It is also known from California (see Type Material).

Remarks.—This species is distinctive be-

cause of its extremely long antennae, with antennal segment V often longer than segments III and IV. It is generally a large species, with a large head bearing unusually small eyes (Fig. 17). The antennal sensoria in apterae are often extremely small and bead-like (Fig. 23). No other *Macrosiphum* known to me are particularly similar to *M. holodisci*.

Two other *Macrosiphum*, *Macrosiphum pteridis* Wilson and *Macrosiphum clydesmithi* Robinson can be found on *Holodiscus*. *Macrosiphum holodisci* differs from these in many characters, such as its more setose cauda (*M. pteridis* and *M. clydesmithi* have fewer than 10 caudal setae), long antennae with banded joints, white color in life, and many others.

Macrosiphum insularis (Pergande)
(Figs. 25–34)

Nectarophora insularis Pergande 1900: 515.

Sitobion insularis: Eastop and Hille Ris Lambers, 1976: 404; Remaudière & Remaudière 1997: 145.

Macrosiphum (*Sitobion*) *insularis*: Smith and Parron 1978: 191.

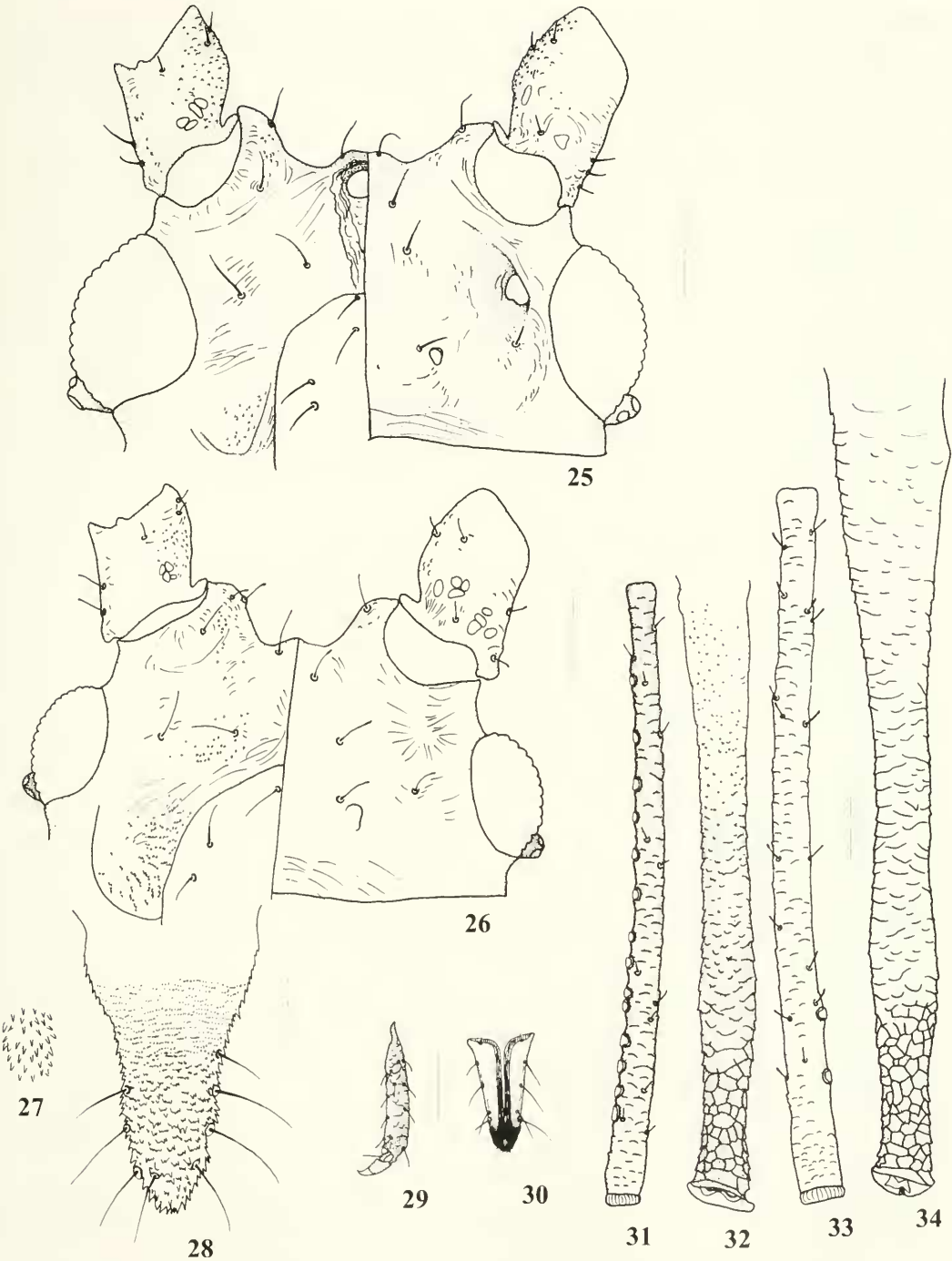
Macrosiphum insularis: Jensen 1997: 341.

Macrosiphum yagasogae Hottes 1948: 34; Hottes 1949: 55; Palmer 1952: 330. **New synonymy.**

Sitobion insulare subsp. *yagasogae*: Eastop and Hille Ris Lambers 1976: 404; Quist 1978: 37; Remaudière & Remaudière 1997: 145.

Macrosiphum (*Sitobion*) *insulare* subsp. *yagasogae*: Smith and Parron 1978: 191; Forbes and Chan 1989: 34.

Biology and distribution.—Hottes (1948: 36) summarized well the known biology of this species in his original description of *M. yagasogae*: "This species may be collected on the under sides of the leaves of Solomon's Seal *Polygonatum commutatum*. It is very easily disturbed and the slightest jar causes specimens to drop to the ground. As a rule the specimens are taken as solitary



Figs. 25–34. *Macrosiphum insularis*. 25, Head of alata. 26, Head of aptera. 27, Spinulation of ventral surface of cauda of aptera. 28, Cauda of aptera, dorsal surface. 29, Protarsal II of aptera. 30, U.r.s. of aptera. 31, A.s. III of alata. 32, Siphunculus of alata. 33, A.s. III of aptera. 34, Siphunculus of aptera. All scale bars equal 0.10 mm.

individuals and never more than one or two to a plant. I have collected many immature individuals but mature ones are few." This plant is now known as *Polygonatum biflorum* (Walt.) Ell (Liliaceae) and does not occur in Colorado. Therefore the host plant in Colorado is uncertain. According to Hultén (1968), the only large liliaceous plants on St. Paul Island are *Fritillaria camschatcensis* (L.) Ker.-Gawl. and *Streptopus amplexifolius* (L.) DC. *Polygonatum biflorum* and *S. amplexifolius* have similar vegetative morphology and in both plants flowers occur in the leaf axils along the stems. To the casual observer they are similar in overall appearance. Hottes had worked in Illinois, where *P. biflorum* does occur, and while working in Colorado could very easily have mistaken *S. amplexifolius* for *P. biflorum*. I suspect that the host of this species on St. Paul Island and in Colorado is *S. amplexifolius*. The discovery of this aphid on *S. amplexifolius* in Oregon and British Columbia supports this conclusion. In Oregon the aphids were feeding on the immature fruits and undersides of the leaves of several plants growing beside two small streams.

This species is known from the type collection, St. Paul Island (170°W × 57°N, more than 250 miles from the main chain of Aleutian Islands, and from mainland Alaska), from Utah and Colorado (Smith & Parron, 1978), Oregon, and British Columbia, Canada (this paper).

Remarks.—The synonymy of *M. yagasogae* is based on the fact that the only character useful in separating it from the types of *M. insularis* is the usual presence of large spinal tubercles on tergites VII and VIII. However, some specimens of *M. yagasogae* from Colorado in the BMNH have small spinal tubercles as in the type series of *M. insularis*. Therefore, because the forms are so similar morphologically it is best to include both under a single name until more detailed information comes to light to support the subspecific ranking of *M. yagasogae*.

Differences between this species and *M.*

badium and *M. wilsoni*, which feed on related lily host plants, are discussed under those species. Similar species include *Macrosiphum oregonense* n. sp., *M. vancouveriae* n. sp., and *M. violae* n. sp. It differs from the latter by having metatarsal II longer than u.r.s. *M. vancouveriae* is distinctive because of its distinctly separate middle pair of gonapophyses. *Macrosiphum insularis* differs from *M. oregonense* by having setae on a.s. III less than 0.6 times the basal width of that segment in apterae (the ratio is more than 0.6 in *M. oregonense*).

Another species, *Macrosiphum pechumani* MacGillivray, feeds on a related lily (*Maianthemum racemosa*), and differs from *M. insularis* by its entirely black siphunculi, dark cauda (both pale in apterae of *M. insularis*), and its a.s. III with sensoria scattered over more than one half of its length in apterae (sensoria restricted to basal one half of a.s. III in *M. insularis*). *Macrosiphum lilii* (Monell) feeds on *Lilium* species, which have different growth habits and habitats than the hosts of the Liliaceae-feeding *Macrosiphum* species discussed in this paper. It differs markedly from *M. badium* and the other lily-feeding species in this paper by its black siphunculi, membranous tergum in apterae, 2 pairs of dorsal setae on protarsal I, and many other characters, but see also the key to lily-feeding *Macrosiphum* at the end of this paper.

This species was described thoroughly by Hottes (1948, 1949). Illustrations are here provided to supplement previous descriptions, and the following additional notes can be made: ocular tubercles brown and interfacetal spaces dusky; protarsal II with 3 pairs of dorsal setae; ventral surface of head with a sparse band of spinules between antennal tubercles and mouthparts, many spinules on each side of mouthparts posteriorly.

Macrosiphum occidentalis (Essig)

Amphorophora occidentalis Essig 1942: 4.
Macrosiphum occidentalis: Eastop & Hille
 Ris Lambers 1976: 262; Remaudière &

Remaudière 1997: 115 (as synonym of *Macrosiphum osmaroniae* Wilson); Jensen 1997: 341.

Illinoia occidentalis: Smith & Parron 1978: 158 (as synonym of *Macrosiphum osmaroniae* Wilson).

Biology and distribution.—This species was described by Essig from *Prunus emarginata* (Dougl.) Walk. (Rosaceae), collected on the University of Washington campus in Seattle. I have collected the species only from *Oemleria occidentalis* (Rosaceae). While it is possible that this aphid feeds on both host plants, I suspect that Essig's record may be incorrect. Both plants have similar inflorescences, and can have black fruits. They also co-occur in western Washington. Essig's specimens were collected from plants growing "under larger trees," the exact type of condition one expects to find *Oemleria*. At present it cannot be confidently stated whether the aphid feeds on only one or on both plants.

This species is monoecious holocyclic, with alate males. Eggs hatch somewhat later than *M. osmaroniae*, with adult fundatrices usually found in the Corvallis area in early April. These live on the older, more mature leaves, i.e., generally not on the expanding leaves of growing shoots. Aphids can be found reproducing throughout the summer in the shaded locations where this species always lives.

Macrosiphum occidentalis is known from British Columbia (C.K. Chan collections), Washington and Oregon (ASJ collections), and California (UCB material).

Remarks.—This species has been confused over the years with *M. osmaroniae*, and has been placed in *Macrosiphum* and *Illinoia* Wilson most recently. Eastop and Hille Ris Lambers (1976) were apparently the first to synonymize the two species, placing them in *Macrosiphum*. Smith and Parron (1978) followed the earlier decision to synonymize, but placed the species in *Illinoia*, apparently because of its slightly swollen siphunculi. Close examination of

many species of *Macrosiphum* and *Illinoia* has suggested to me that species such as *M. occidentalis* are better placed in *Macrosiphum* for several reasons. First, species that are truly related to the type of *Illinoia*, *I. liriodendri* (Monell) possess swollen and reticulated siphunculi, but the reticulations are usually restricted to the part distad of the swollen area; i.e., the swollen area and the reticulated area are distinctly demarcated. In contrast, the few species of *Macrosiphum* with swollen siphunculi show a reticulated area that gradually blends into the more basal swollen area. Second, *Illinoia* species have only 2 pairs of dorsal setae on protarsal II, whereas *M. occidentalis* and its relatives have 3 or more such setae. Third, nearly all *Illinoia* species have relatively short a.s. VIa, being less than 0.3 times a.s. V, while *M. occidentalis* and its relatives have this ratio greater than 0.3. There are a few other general rules that I have observed that serve to separate *Illinoia* from *Macrosiphum*. Hopefully these can be addressed more fully in a later paper, and all the species in the two genera placed in the correct genus.

It is clear that *M. occidentalis* and *M. osmaroniae* are different species. First, in the field they inhabit different parts of the plant, have different types of life cycles, and adopt different postures, i.e. adults of *M. occidentalis* often feed with their antennae directed forward and slightly to the side, whereas *M. osmaroniae* adults have the typical *Macrosiphum* habit of folding the antennae back along the body. Secondly, their morphology is drastically different in some respects. For example, the u.r.s. of *M. occidentalis* is much shorter (shorter than metatarsal II in *M. occidentalis*, equal to or longer than metatarsal II in *M. osmaroniae*), and its cauda is more setose (normally 10 or more setae in *M. occidentalis*, less than 10 in *M. osmaroniae*), among other things.

A truly similar species is *Macrosiphum parvifolii* (Richards). The two species are similar overall, but can be separated by spe-

cific characters as follows. *Macrosiphum occidentalis* has less swollen siphunculi (only slightly swollen in *M. occidentalis*, distinctly swollen basad of the reticulations in *M. parvifolii*), a.s. V not longer than a.s. III (a.s. V often longer than a.s. III in *M. parvifolii*), and much smaller spinal and lateral tubercles (lateral tubercles in *M. occidentalis* about as wide as a setal base, in *M. parvifolii* much wider than a setal base). *Macrosiphum willamettense* n. sp. is also similar, but its apterae and alatae have only 7–9 caudal setae as opposed to 9–14 in *M. occidentalis*.

Illustrations by Essig (1942) are adequate, but note that the abdominal dorsum in the apterae has sclerotized bands as in Essig's figure, but these bands are pale, not pigmented as drawn. The type specimens from which the drawings were made are stained, which made the pale sclerotized bands more apparent than they would be otherwise. Other notes that can be added: the ocular tubercles and interfacetal spaces are pale or only slightly pigmented; the compound eyes are small, with a large gap between them and the antennal bases, much as in *M. holodisci* (similar to Fig. 17); the ventral surface of the head has only a few spinules; the a.s. III of the aptera often lacks sensoria altogether; protarsal II with more than 3 pairs of dorsal setae.

***Macrosiphum oregonense* Jensen,
new species
(Figs. 35–44)**

Apterae (17 specimens measured).—*Color*: When alive, more or less shiny green, nearly concolorous with bottom of leaf. Nymphs paler due to light dusting of wax. When macerated, a.s. IV with apex dusky, a.s. V entirely dusky to brown at tip to dusky only at tip, a.s. VI brown throughout to dusky at base and brown from primary sensoria onward. Rostrum with segment III dusky, u.r.s. light brown to brown. Compound eyes with interfacetal spaces and ocular tubercles distinctly pigmented. Tips of tibiae dusky to brown. Tarsi brown to dark

brown. Siphunculi usually with reticulated part dusky to brown. Otherwise pale.

Morphology: Body length 2.34–3.74 mm. A.s. III 0.51–0.73 mm long; a.s. IV 0.29–0.60 mm long, 0.57–0.85 times a.s. III; a.s. V 0.37–0.60 mm long, 0.67–0.84 times a.s. III; a.s. VIa 0.18–0.23 mm long, 0.35–0.53 times a.s. V, a.s. VIb 0.80–1.14 mm long, 1.36–1.64 times a.s. III; a.s. III lightly imbricated throughout, with 1–4 sensoria restricted to base (Fig. 43), with longest seta 0.03–0.05 mm long, 0.65–1.19 times basal width of segment; a.s. I usually with moderately dense, fine ornamentation medially, most of ventral surface also ornamented, with a few spinules dorsally (Fig. 36), sometimes this is very reduced to nearly smooth, with 1–4 setae laterally; a.s. II finely, usually densely, ornamented medially, and ventrally. Ventral surface of head usually extensively spinulate on antennal tubercles and over most of ventral surface of head, extending rearward to large patches at posterior margin of head (Fig. 36). Head usually without spinal tubercles, sometimes with 1 or 2 small tubercles. Antennal tubercles large, slightly diverging, with 2–3 setae medially and 1–2 setae ventrally; longest seta 0.04–0.08 mm long and 0.94–2.07 times basal width a.s. III; median prominence small but distinct. Setae on head and antennae narrowly blunt to finely pointed. Rostrum reaching to mesocoxae, u.r.s. 0.13–0.15 mm long and 0.85–1.09 times metatarsal II, with 6–11 accessory setae. Prothorax usually without lateral tubercles. Dorsal setae slightly blunt to more or less pointed, sternal, coxal, trochantal setae pointed. Femora with setae more or less pointed, with no ventral setae dramatically longer than others, ornamentation very prominent, dense, especially anterioapico-ventrally, and apicodorsally, extending through about apical one half, very lightly ornamented posteriorly; metafemora 0.91–1.30 mm long. Tibiae with basal setae broadly to narrowly blunt, mesotibiae with basal setae 0.03–0.06 mm long, apical setae 0.04–0.06 mm long; metatibiae 1.56–2.25



Figs. 35–44. *Macrosiphum oregonense*. 35, Head of alata. 36, Head of aptera. 37, Spinulation of ventral surface of cauda of aptera. 38, Cauda of aptera, dorsal surface. 39, Protarsal II of aptera. 40, U.r.s. of aptera. 41, A.s. III of alata. 42, Siphunculus of alata. 43, A.s. III of aptera. 44, Siphunculus of aptera. All scale bars equal 0.10 mm.

mm long. Tarsal segments I all with 3 setae; protarsal II with 3 or 4 pairs dorsal setae (Fig. 39); metatarsal II 0.13–0.17 mm long. Abdominal tergum faintly sclerotized, sometimes lightly wrinkled. Lateral tubercles usually lacking, occasionally 1 or 2 present among segments II–V. Dorsal setae narrowly blunt to finely pointed, longest seta on tergites II–IV 0.03–0.05 mm long; ventral setae narrowly blunt to pointed. Siphunculi 0.58–0.91 mm long and 1.13–1.45 times a.s. III, with 5–10 rows of reticulations, part just basad of these often slightly swollen, this part covered with prominent imbrication (Fig. 44). Cauda 0.25–0.43 mm long, with 7–11 setae; ventral spinules moderately large, mostly single, often with a few doubles (Fig. 37); dorsal ornamentation composed of dense, acutely or bluntly bi- to multi-dentate tooth-like structures, about 10 across width of cauda, but sometimes partially fused side to side (Fig. 38). Tergites VII and VIII often without spinal tubercles, sometimes with small, low tubercles or traces thereof; longest of 5–10 setae on tergite VIII 0.06–0.10 mm long and 1.53–2.50 times basal width a.s. III, finely pointed. Middle pair gonapophyses fused.

Alatae (12 specimens measured).—*Color*: When alive, green with sclerotized areas brownish. When macerated, head brown to dark brown, with areas around ocelli darker, and antennal tubercles lighter or sometimes pale. Compound eyes and ocular tubercles brown. A.s. I and II dusky. A.s. III slightly dusky apically to light brown or brown throughout, getting darker toward apex; a.s. IV dusky over apical one third to brown throughout; a.s. V slightly dusky at base, darkening to brown at apex, to brown throughout; a.s. VI brown throughout. Rostrum with segment III dusky, u.r.s. brown. Pronotum light brown to brown, other thoracic plates dark brown. Eyes with ocular tubercles and interfacetal spaces brown. Tips of tibiae and all of tarsi brown. Abdominal segments II–IV with large, dark brown lateral sclerites. Small lateral sclerites on segment I, pleural intersegmental

muscle attachment plates on segments I–VII, small, irregular spinal sclerites on segments I–VI, and large postsiphuncular sclerites brown, which are fused with a broad light brown cross band on tergite VII, all brown. Tergite VIII usually with a dusky cross band. Siphunculi entirely brown, sometimes paler toward base. Cauda at most slightly dusky. Otherwise pale.

Morphology: Body length 3.14–3.97 mm. A.s. III 0.63–0.86 mm long; a.s. IV 0.45–0.68 mm long, 0.64–0.82 times a.s. III; a.s. V 0.45–0.70 mm long, 0.68–0.88 times a.s. III, a.s. VIa 0.19–0.27 mm long, 0.32–0.46 times a.s. V; a.s. VIb 0.92–1.18 mm long, 1.35–1.53 times a.s. III; a.s. III lightly imbricated, with a single row of 7–17 sensoria scattered over almost entire length, with short gap apically (Fig. 41); longest seta on a.s. III 0.03–0.04 mm long, 0.67–0.86 times basal width of segment; a.s. I finely, lightly to moderately densely ornamented medially, with or without a distinct patch ventrolaterally and a few spinules ventrally and dorsally (Fig. 35), with 1–4 setae laterally; a.s. II moderately, finely ornamented medially and ventrally. Ventral surface of head with only a few spinules on antennal tubercles and large patches of fine spinules posteriorly (Fig. 35). Head with 1 or 2 small spinal tubercles sometimes present. Antennal tubercles moderately large, slightly diverging, with 2–4 setae medially and 1–2 setae ventrally; longest seta 0.04–0.09 mm long and 0.93–2.00 times basal width a.s. III; median prominence small but distinct. Setae on head and antennae more or less pointed. Rostrum reaching to middle of mesothorax, u.r.s. 0.13–0.15 mm long and 0.85–0.95 times metatarsal II, with 7–11 accessory setae. Thoracic sclerites normal. Prothorax sometimes with lateral tubercles, sometimes with spinal setae doubled (i.e., 2 pairs, rather than the normal 1 pair of spinal setae). Dorsal, ventral, coxal and trochantal setae pointed. Femora with setae narrowly blunt to pointed, no ventral ones dramatically longer than others; ornamentation essentially as in apterae; meta-

femora 1.04–1.32 mm long. Tibiae with basal setae blunt to more or less pointed; mesotibiae with basal setae 0.03–0.05 mm long, apical setae 0.03–0.05 mm long; metatibiae 1.91–2.49 mm long. Metatarsal II 0.15–0.17 mm long. Abdominal tergum membranous except pigmented sclerotized areas described above. Some of segments II–IV sometimes with lateral tubercles. Dorsal and ventral setae very narrowly blunt to pointed; longest seta on tergites II–IV 0.04–0.08 mm long. Siphunculi 0.58–0.86 mm long and 0.82–1.10 times a.s. III, with sometimes more than 20 rows of reticulations, which extend sometimes almost one half length of siphunculus, or these may be very dense, prominent imbrications, dense imbrications in about basal one half, which become very small and spinulate to base; apical one half of siphunculi sometimes slightly swollen (Fig. 42). Cauda 0.29–0.38 mm long, with 7–10 setae, ornamentation essentially as in apterae. Tergites VII and VIII usually without spinal tubercles, sometimes with 1 or 2 or traces thereof; longest of 6–9 setae on tergite VIII 0.06–0.10 mm long and 1.44–2.31 times basal width a.s. III. Otherwise as in apterae.

Oviparae (10 specimens measured).—*Color*: When alive, matt light green, nymphs slightly waxy, adults smooth, without wax. When macerated, essentially as in apterae.

Morphology: Body length 2.39–3.24 mm. A.s. III 0.47–0.67 mm long; a.s. IV 0.31–0.49 mm long, 0.60–0.73 times a.s. III; a.s. V 0.35–0.53 mm long, 0.72–0.81 times a.s. III; a.s. VIa 0.17–0.23 mm long, 0.41–0.53 times a.s. V; a.s. VIb 0.71–1.00 mm long, 1.27–1.74 times a.s. III; a.s. III with 0–4 sensoria; a.s. I with 0–4 setae laterally; a.s. II finely, moderately or lightly, ornamented medially and ventrally. Antennal tubercles with 2–3 setae medially and 0–1 seta ventrally. Femora with ornamentation variable, reduced compared to apterae; metafemora 0.85–1.13 mm long. Tibiae with basal setae slightly capitate to broadly to narrowly blunt; metatibiae 1.46–2.00

mm long, slightly swollen over about basal $\frac{3}{4}$, with numerous scent plaques. Metatarsal II 0.13–0.16 mm long. Abdominal tergum membranous. Siphunculi 0.59–0.85 mm long and 1.13–1.31 times a.s. III. Cauda 0.24–0.32 mm long, with 7–12 setae. Tergite VIII with 8–11 setae, the longest being 0.05–0.08 mm long and 1.15–2.29 times basal width a.s. III. Otherwise more or less as in apterae.

Alate males (5 specimens measured).—*Color*: When alive, dark green with extensive black sclerotized areas. When macerated, a.s. III dusky to brown throughout, with a short pale area basally. Large lateral sclerites on abdominal segments II–IV, smaller ones on segments I, V and VII, large pleural intersegmental muscle attachment plates on segments I–V, which are often connected by cross-bands, large isolated postsiphuncular sclerites, small spinal pigmented areas on tergites VI–VIII and small ventrolateral patches on segments I–VI all brown to dark brown. Cauda and claspers dusky to brown. Otherwise as in alatae.

Morphology: Body length 2.70–3.04 mm. A.s. III 0.74–0.81 mm long; a.s. IV 0.58–0.65 mm long, 0.76–0.85 times a.s. III; a.s. V 0.65–0.71 mm long, 0.84–0.92 times a.s. III; a.s. VIa 0.23–0.26 mm long, 0.35–0.39 times a.s. V; a.s. VIb 1.03–1.10 mm long, 1.33–1.42 times a.s. III; a.s. III with 30–38 sensoria scattered over entire length, a.s. IV without sensoria, a.s. V with 15–23 secondary sensoria, with a gap basally; a.s. I with 1–3 setae laterally. Antennal tubercles moderately large, slightly diverging, with 2–4 setae medially and 1–2 setae ventrally. Rostrum with u.r.s. 0.13–0.14 mm long and 0.85–0.92 times metatarsal II, with 4–9 accessory setae. Metafemora 1.06–1.18 mm long. Tibiae with basal setae more or less pointed; metatibiae 1.97–2.22 mm long. Metatarsal II 0.13–0.16 mm long. Abdominal segments II–IV apparently without lateral tubercles. Spinal areas of some tergites anterior to siphunculi with spinules. Siphunculi 0.54–0.61 mm long and 0.73–0.78 times a.s. III. Cauda

0.15–0.23 mm long, with 7–10 setae. Tergite VIII with 4–6 finely pointed setae, the longest 0.06–0.07 mm long and 1.47–1.81 times basal width a.s. III. Claspers normal, with a narrow, smooth gap between them anteriorly. Otherwise as in alatae.

Type material.—*Holotype aptera*: Oregon, Hood River County, Eagle Creek Park, ex *Lysichitum americanum* Hultén & St. John, 21 May 1993, A.S. Jensen, deposited in the USNM.

Paratype apterae: 2 same data as holotype (1 USNM, 1 BMNH); 1 same data as the holotype except the date: 18 April 1992 (OSU); 1 Oregon, Lincoln County, Van Duzer Corridor, ex *L. americanum*, 13 July 1991, G.L. Reed (1 CNC).

Paratype alatae: 3 same data as the holotype (1 OSU, 1 USNM, 1 BMNH); 1 Oregon, Lincoln County, Van Duzer Corridor, ex *L. americanum*, 13 July 1991, G.L. Reed (1 CNC).

Paratype oviparae: 2 Oregon, Hood River County, Eagle Creek Park, ex *L. americanum*, 20 October 1993, A.S. Jensen (1 OSU, 1 USNM); 2 Oregon, Linn County, Lost Prairie, ex *L. americanum*, 24 September 1994 (1 CNC, 1 BMNH).

Paratype alate males: 1 Oregon, Hood River County, Eagle Creek Park, ex *L. americanum*, 20 October 1993, A.S. Jensen (1 OSU, 1 USNM); 2 Oregon, Linn County, Lost Prairie, ex *L. americanum*, 24 September 1994 (1 CNC, 1 BMNH).

Additional material.—Many specimens of all four stages from western Oregon, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species is monoecious holocyclic on its host, *Lysichitum americanum* Hultén and St. John (Araceae). This plant is a semiaquatic herb with large broad leaves (some leaves reaching more than a meter in length), often growing in seeps, roadside ditches, and seasonally flooded areas. The particularly interesting thing about this aphid is that it can be found in the latter type of site. One collection in Benton County, Oregon was from

a plant that is completely submerged during the winter. Whether the aphid overwinters in this site was never determined, but the possibility is most intriguing. Aphids feed on the undersurface of the leaves or among the bases of the leaves near the ground.

I have made collections of this species only in Oregon, and have seen one specimen from British Columbia. A few specimens recently were borrowed from Washington State University, Prosser, which were collected in Klickitat County, Washington. The distribution of the host plant is Alaska to California and east to Montana and Idaho (Hitchcock and Cronquist 1973).

Remarks.—This species has pointed dorsal setae on head, thorax, and abdomen, setae on a.s. III longer than one half the basal width of the segment, and a distinctly sclerotized tergum. This combination of characters is unusual in *Macrosiphum*, especially among species with a relatively long a.s. VIa (usually more than 0.4 times as long as a.s. V) and with more than 2 setae on protarsal II. *Macrosiphum oregonense* is the only *Macrosiphum* in North America that feeds on Araceae.

The name is derived from the state of Oregon, which has a supremely interesting diversity of aphids.

Macrosiphum tolmiea (Essig)

Amphorophora tolmiea Essig 1942: 10.

Macrosiphum tolmiea: Eastop and Hille Ris Lambers 1976: 265; Smith and Parron 1978: 188; Jensen 1997: 335; Remaudière and Remaudière 1997: 117.

Biology and distribution.—The species has been found on three hosts of the Saxifragaceae: *Tolmiea menziesii* (Pursh) T. and G., *Tellima grandiflora* (Pursh) Dougl., and *Mitella caulescens* Nutt. (all Saxifragaceae), and only near streams or seeps in shaded locations. Despite extensive collecting and searching, I have not been able to discover all of the details of the life history of this species. Apteræ and alatae can be found as early as late winter, without any

fundatrix apparent. Apterae and alatae can then be found throughout the spring on the flowering stalks of the hosts. As the period of host flowering and fruiting ends, the aphids become increasingly rare. I have not located this species during the fall season despite much searching, the latest collection being 9 September. Given the early appearance of this species, and the lack of a detectable sexual generation, I conclude that the species is probably anholocyclic.

Sharing the same plants throughout the year is a *Nasonovia* (*Kakimia*) *Hottes* and *Frison* species (a form similar to *cynosbati* (Oestlund)). I have observed first instars of this species apparently preparing to overwinter on *Tolmiea* at the leaf bases near the crown of large plants in stream banks. This *Kakimia* also appears as adults very early in the spring, and very often lives in mixed colonies with *M. tolmiea*. It also disappears in early summer, much as in *M. tolmiea*. Given the otherwise similar biology of this *Kakimia* species, it is reasonable to suggest that *M. tolmiea* may overwinter in a similar way.

Macrosiphum tolmiea has been collected in British Columbia, Washington, and Oregon, all west of the Cascade mountains. Its known hosts have very similar distributions, from British Columbia or Alaska south to northern California, with *T. grandiflora* and *M. caulescens* extending eastward to Idaho and Montana (Hitchcock and Cronquist, 1973).

Remarks.—This species is unique among *Macrosiphum* with strongly sclerotized pale terga in that its u.r.s. is long and unusually setose (0.14–0.19 mm long, with more than 10 accessory setae in most specimens), the alatae have few sensoria on a.s. III (0–11), and apterae almost always lack sensoria on a.s. III. This is the only North American *Macrosiphum* species other than the polyphagous *M. euphorbiae* that feeds on Saxifragaceae. The sclerotized tergum in apterae of *M. tolmiea* and the sensoria in a single row on a.s. III of its alatae are two of the many characters that separate the two

species (*M. euphorbiae* apterae have a membranous tergum and alatae almost always have more than 11 sensoria that are often not in a straight row on a.s. III).

The description and figures by Essig (1942) are adequate, but a few additions can be made for adequate comparison to other western North American species. The ocular tubercles and interfacetal spaces are brown, the ventral surface of the head has many minute spinules from the antennal tubercles to the mouthparts (only a few spinules in the alatae), and protarsal II has 3 pairs of dorsal setae.

Macrosiphum tuberculiceps (Essig)

Amphorophora tuberculiceps Essig 1942: 12.

Macrosiphum tuberculiceps: Eastop and Hille Ris Lambers 1976: 265; Smith and Parron 1978: 188.

Biology and distribution.—This species is monoecious holocyclic on its only known host plant, *Achlys triphylla* (Smith) DC. (Berberidaceae). In the Corvallis area, egg hatch occurs in March. Fundatrices mature in April. Alatae are rarely produced. Oviparae and the rarer alate males can be found in October and November. Populations are dispersed, with few aphids on any given plant. The aphid is rare and difficult to find at times. Adults are apt to drop when plants are disturbed.

Macrosiphum tuberculiceps is known so far only from Oregon and Washington. In the CNC there is a large series of slide-mounted specimens collected by W. R. Richards in British Columbia that probably are this species. The plant is known from western British Columbia to northwestern California, from the Cascade Mountains to the coast (Hitchcock and Cronquist 1973).

Remarks.—This species is relatively easy to distinguish from other *Macrosiphum* because it has four setae on tarsal segments I, a more setose cauda than most *Macrosiphum* (up to 16 setae), and often has spinal tubercles on the pronotum. This is the only

aphid known from *Achlys*. The only other species of *Macrosiphum* that feeds on *Berberidaceae* is *M. vancouveriae*, which differs from *M. tuberculiceps* in many characters, including its less setose cauda and possession of only 3 setae on tarsal segments I (*M. tuberculiceps* has 4), among many other characters.

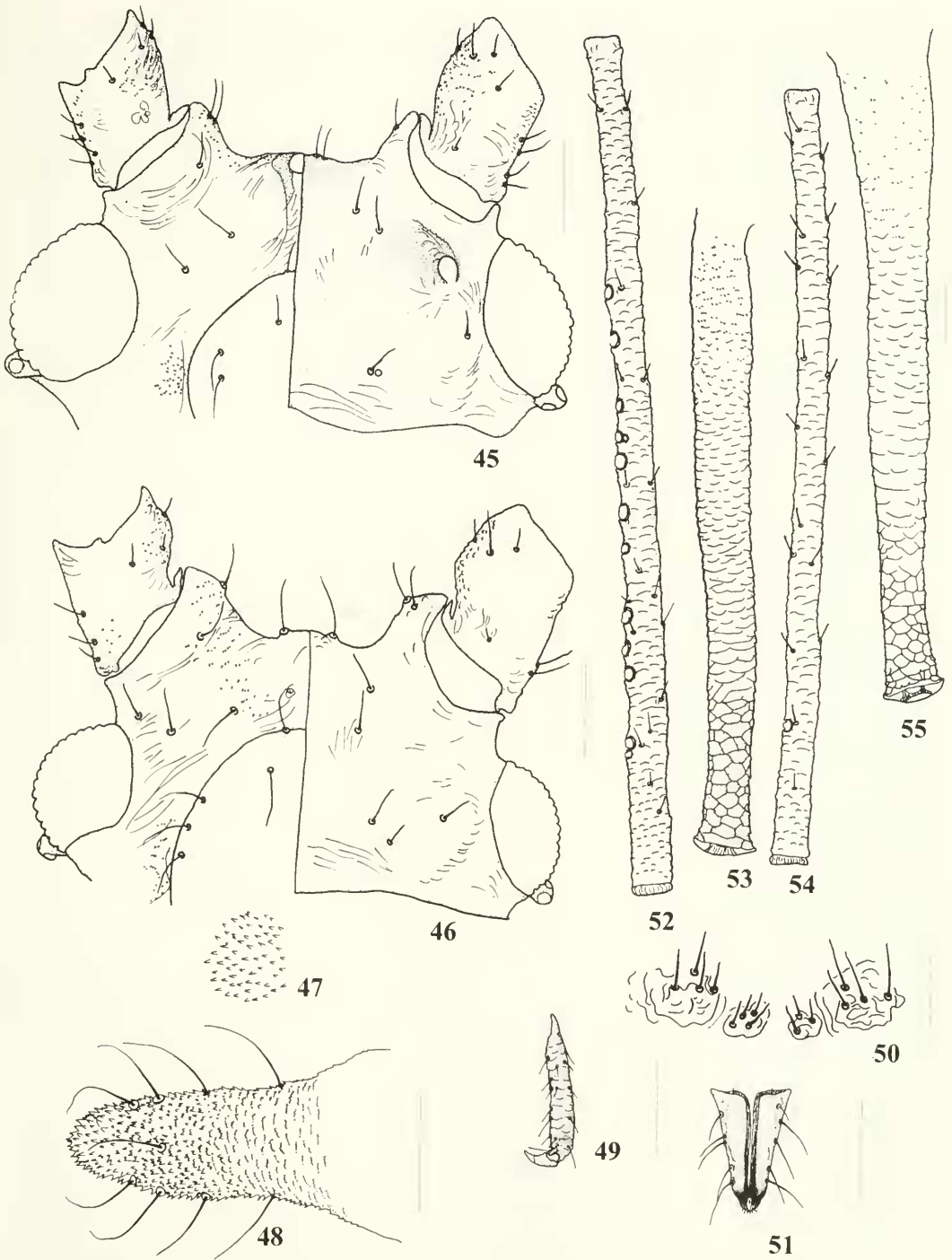
The description and figures by Essig (1942) are adequate. At the time of his description, the actual host plant of this species was not known, which probably led to its never being identified since. It should be noted that the dorsal head tubercles for which Essig named this species are not the usual condition for the species. The single available alate vivipara has large spinal tubercles on the head, but these are in the normal position, not as drawn by Essig. The following notes can also be added to the original description: ocular tubercles and interfacetal spaces brown; protarsal II with 3 or 4 pairs of dorsal setae; tarsal segments I with 4 setae, 2 lateral and 2 "sense pegs" between; pronotum often with spinal tubercles; ventral surface of head with many spinules scattered from antennal tubercles to mouthparts and posteriorly on each side.

***Macrosiphum vancouveriae* Jensen,
new species
(Figs. 45–55)**

Apterae (19 specimens measured).—*Color*: When alive, very pale green to white. When macerated, tips of a.s. IV and V dusky, all of VI light brown. Compound eyes with ocular tubercles and interfacetal spaces light brown. Rostral segment III dusky and u.r.s. brown. Tips of tibiae light brown to brown. Tarsi brown to dark brown. Up to apical one half of siphunculi dusky. Otherwise pale.

Morphology: Body length 2.22–3.76 mm. A.s. III 0.67–0.98 mm long; a.s. IV 0.50–0.74 mm long, 0.66–0.88 times a.s. III, a.s. V 0.50–0.70 mm long, 0.64–0.89 times a.s. III; a.s. VIa 0.21–0.29 mm long, 0.34–0.46 times a.s. V; a.s. VIb 1.02–1.52 mm long, 1.34–2.00 times a.s. III; a.s. III

imbricated, with 0–3 basal sensoria (Fig. 54); longest seta on a.s. III 0.02–0.03 mm long, 0.50–0.74 times as long as basal width of segment; a.s. I and II with sparse, small spinules ventrally and medially, smooth dorsally; a.s. I with 2–6 setae laterally. Ventral surface of head with bands of spinules extending from antennal tubercles to about base of clypeus, and with small patch of spinules at posterior margin, on each side of mouthparts (Fig. 46). Head often with low spinal tubercles. Antennal tubercles moderately large, diverging, with 2–3 setae medially and 1 ventrally; longest seta 0.03–0.05 mm long and 0.80–1.38 times basal width a.s. III; median prominence small but distinct (Fig. 46). Setae on head and antennae thin, narrowly blunt. Rostrum reaching to mesocoxae, u.r.s. 0.13–0.15 mm long and 0.77–0.92 times metatarsal II, with 9–13 accessory setae. Prothorax with indistinct lateral tubercles. Thorax with dorsal setae narrowly blunt, sternal, coxal and trochantal setae pointed. Femora with setae narrowly blunt to pointed, no ventral ones dramatically longer than all others; femoral ornamentation nearly limited to anterior and dorsal surfaces, most dense dorsoapically, but sometimes with a few spinules posteriorly; metafemora 0.92–1.35 mm long. Tibiae with basal setae widely blunt to slightly capitate, apical setae pointed; mesotibiae with basal setae 0.03–0.04 mm long, apical setae 0.04–0.06 mm long; tibial setae generally quite long, dense. Metatibiae 1.22–2.40 mm long. Tarsal segments I with 3 setae; protarsal II with 3 or 4 pairs of dorsal setae (Fig. 49); metatarsal II 0.14–0.18 mm long. Abdominal tergum uniformly sclerotic, somewhat wrinkled. Tergites II–V sometimes with low, indistinct lateral tubercles. Dorsal setae thin, narrowly blunt to pointed, longest seta on tergites II–IV 0.02–0.03 mm long; ventral setae pointed. Siphunculi 0.54–0.94 mm long and 0.69–1.10 times a.s. III, with about 10 rows of reticulations apically, ribbed imbrications in middle (Fig. 55). Cauda 0.28–0.44 mm long, with 7–11 setae,



Figs. 45-55. *Macrosiphum vancouveriae*. 45, Head of alata. 46, Head of aptera. 47, Spinulation of ventral surface of cauda of aptera. 48, Cauda of aptera, dorsal surface. 49, Protarsal II of aptera. 50, Gonapophyses of aptera. 51, U.r.s. of aptera. 52, A.s. III of alata. 53, Siphunculus of alata. 54, A.s. III of aptera. 55, Siphunculus of aptera. All scale bars equal 0.10 mm.

ventral spinules almost entirely single, even basally and apically, sparse, pointed (Fig. 47); dorsal ornamentation composed of small, mostly tricuspid tooth-like structures, 10–20 across width of cauda in middle (Fig. 48). Tergites VII and VIII generally without spinal tubercles, sometimes with 1 or 2 low, indistinct ones; longest of the 4–8 setae on tergite VIII 0.05–0.07 mm long and 1.19–1.79 times basal width a.s. III. Middle pair of gonapophyses usually distinctly separate (Fig. 50).

Alatae (5 specimens measured).—*Color*: When alive, more or less white, with sclerotized areas conspicuously brown. When macerated, head light brown, with antennal tubercles lighter, and darker areas surrounding ocelli. Antennae with segment I dusky, darker medially, a.s. II uniformly dusky, a.s. III–V dusky with darker apices, a.s. VI light brown. Eyes with ocular tubercles and interfacetal spaces light brown. Rostrum with segment III and u.r.s. light brown to brown. Thorax with sclerotized plates dark brown. Femora dusky to light brown, except extreme base, which is pale. Tibiae with apices brown. Tarsi brown. Abdomen with pleural and spinal intersegmental muscle attachment plates large, brown, lateral sclerites usually pale, sometimes with small, dense, pigmented areas within them. Segments posterior to siphunculi pale dorsally and ventrally. Siphunculi with about apical one half dusky. Cauda dusky to light brown. Otherwise pale.

Morphology: Body length 3.10–3.54 mm. A.s. III 0.85–1.00 mm long; a.s. IV 0.69–0.78 mm long, 0.76–0.88 times a.s. III; a.s. V 0.66–0.76 mm long, 0.73–0.86 times a.s. III; a.s. VIa 0.25–0.29 mm long, 0.36–0.43 times a.s. V; a.s. VIb 1.40–1.53 mm long, 0.86–1.65 times a.s. III; a.s. III imbricated, with 7–12 sensoria scattered in a single row over about basal three quarters (Fig. 52); longest seta on a.s. III 0.02–0.03 mm long, 0.50–0.67 times as long as basal width of segment; a.s. I rough medially, with many small spinulate imbrications, otherwise smooth (Fig. 45); a.s. II more

lightly ornamented ventrally and medially; a.s. I with 3–5 setae laterally. Venter of head with few spinules, these mostly limited to antennal tubercles and a small patch on each side posteriorly (Fig. 45). Head with spinal tubercles, often large ones. Antennal tubercles large, diverging, with 1–2 setae medially, and 1–2 setae ventrally, median prominence small (Fig. 45); longest seta 0.04 mm long, 0.88–1.07 times basal width a.s. III. Setae on head more or less pointed, those on antennae slightly capitate to blunt. Rostrum reaching middle of mesothorax, u.r.s. 0.14–0.15 mm long and 0.80–0.88 times metatarsal II, with 10–11 accessory setae. Thorax with sclerotized thoracic plates normal. Dorsal, sternal, coxal and trochantal setae all pointed. Femora with setae pointed, no ventral ones dramatically longer than others; ornamentation essentially restricted to anterior surface toward apex, and the dorsoapical part, which is quite rough; metafemora 1.14–1.28 mm long. Tibiae with basal setae blunt, apical setae pointed; mesotibiae with basal setae 0.03 mm long, apical setae 0.02–0.04 mm long. Metatibiae 2.10–2.41 mm long. Metatarsal II 0.16–0.18 mm long. Abdominal tergum membranous except pigmented areas described above and small, lightly sclerotized lateral sclerites. Segments II–V sometimes with indistinct, low lateral tubercles. Dorsal setae narrowly blunt, ventral setae pointed; longest seta on tergites II–IV 0.02–0.04 mm long. Siphunculi 0.71–0.76 mm long and 0.75–0.86 times a.s. III, with about 10 rows reticulations, densely imbricate basad of these (Fig. 53). Cauda 0.34–0.38 mm long, with 9–12 setae, ventral spinules large, moderately dense, dorsal ornamentation composed of small, toothlike structures with 1–3 points, both blunt and pointed. Tergites VII and VIII sometimes with 1 or 2 small spinal tubercles; longest of the 5–8 setae on tergite VIII 0.05–0.06 mm long and 1.31–1.67 times basal width a.s. III. Otherwise as in apterae.

Oviparae (9 specimens measured).—*Color*: When macerated, apical fifth of a.s. V

and all of VI dusky to light brown. Eyes with ocular tubercles and interfacetal spaces dusky or light brown. Rostrum with segment III slightly dusky, u.r.s. light brown. Tibiae with apices light brown. Tarsi brown. Otherwise pale.

Morphology: Body length 2.53–3.11 mm. A.s. III 0.73–0.95 mm long; a.s. IV 0.48–0.67 mm long, 0.63–0.74 times a.s. III; a.s. V 0.48–0.70 mm long, 0.64–0.74 times a.s. III; a.s. VIa 0.20–0.27 mm long, 0.35–0.46 times a.s. V; a.s. VIb 1.05–1.33 mm long, 1.35–1.62 times a.s. III; a.s. III with 0–1 sensorium; longest seta on a.s. III 0.02–0.03 mm long, 0.50–0.67 time as long basal width of segment; a.s. I with ventral and medial spinules few, small, dorsum smooth, with 3–6 setae laterally; a.s. II usually with a few small imbrications ventrally, smooth dorsally. Antennal tubercles slightly lower than in the apterae, with 1–2 setae medially and 1 ventrally; longest seta 0.04–0.05 mm long and 0.88–1.36 times basal width a.s. III. Setae on head pointed, those on antennae blunt. Rostrum reaching slightly beyond mesocoxae, u.r.s. 0.12–0.14 mm long and 0.79–0.92 times metatarsal II, with 10–16 accessory setae. Femora with setae pointed; femoral ornamentation much as in apterae, except somewhat reduced in density; metafemora 0.99–1.25 mm long. Metatibiae 1.84–2.16 mm long, with basal part only slightly swollen, with numerous scent plaques over little more than basal one half. Metatarsal II 0.15–0.17 mm long. Abdominal tergum membranous. Longest seta on tergites II–IV 0.02–0.03 mm long. Siphunculi 0.61–0.81 mm long and 0.77–0.94 times a.s. III. Cauda 0.26–0.32 mm long, with 7–10 setae. Tergites VII and VIII generally without spinal tubercles, sometimes with 1 or 2 low, indistinct ones; longest of the 6–8 setae on tergite VIII 0.06–0.07 mm long and 1.50–1.93 times basal width a.s. III. Otherwise as in apterae.

Alate males (5 specimens measured).—*Color:* When alive, very pale green, with sclerotized areas conspicuously brown. When macerated, head brown, with anten-

nal tubercles slightly paler, and regions around ocelli darker. Antennae with segments I and II dusky, remainder of antennae light brown, except extreme bases of a.s. III–IV, which are pale. Eyes with ocular tubercles brown, interfacetal spaces pale to dusky. Rostrum with segment III dusky, u.r.s. light brown. Sclerotized thoracic plates brown. Femora dusky to light brown, except extreme bases, which are pale. Apices of tibiae and all of tarsi brown. Abdomen with large pleural and spinal muscle attachment plates brown; lateral sclerites on segments II–IV brown. Tergites II–V with dusky spinal pigmented patches that are not united. Segments posterior to siphunculi pale dorsally and ventrally. Claspers light brown. Otherwise pale.

Morphology: Body length 2.48–2.66 mm. A.s. III 0.79–0.98 mm; a.s. IV 0.59–0.83 mm long, 0.75–0.96 times a.s. III; a.s. V 0.57–0.83 mm long, 0.72–0.93 times a.s. III; a.s. VIa 0.17–0.27 mm long, 0.30–0.34 times a.s. V; a.s. VIb 1.27–1.64 mm long, 1.57–1.89 times a.s. III; a.s. III with 28–44 sensoria scattered over entire length, a.s. IV with 16–23 sensoria on apical one half or more, a.s. V with 12–18 secondary sensoria scattered over apical one half to almost entire length; longest seta on a.s. III 0.02 mm long, 0.47–0.67 times as long basal width of segment; a.s. I with 3–8 lateral setae. Venter of head with a few spinules on antennal tubercles (fewer than in alatae) and a small patch posteriorly. Antennal tubercles large, diverging, with 1–2 setae medially, and 1 seta ventrally; longest seta 0.03–0.04 mm long and 0.80–0.97 times basal width a.s. III. Setae on head and antennae more or less pointed. Rostrum reaching middle of mesothorax, u.r.s. 0.12–0.14 mm long and 0.84–0.95 times metatarsal II, with 8–12 accessory setae. Metafemora 0.98–1.10 mm long. Tibiae with all setae pointed, with none thick and spine-like; mesotibiae with basal setae 0.02 mm long, apical setae 0.03 mm long. Metatibiae 1.84–2.15 mm long. Metatarsal II 0.15–0.16 mm long. Abdominal tergum membranous ex-

cept for pigmented areas described above. Dorsal and ventral setae pointed, longest setae on tergites II–IV 0.03–0.04 mm long. Siphunculi 0.51–0.58 mm long and 0.60–0.66 times a.s. III, with about 15 rows reticulations. Cauda 0.19–0.24 mm long, with 7–12 setae, ventral spinules large, moderately dense, dorsal ornamentation as in alatae except the tooth-like structures are sometimes partially fused to form almost complete rows of spinules across width of cauda. Spinal area of tergites anterior to siphunculi with rows of small spinules, especially tergites III–V. Longest of 5–8 setae on tergite VIII 0.05 mm long and 1.20–1.35 times basal width a.s. III. Claspers of normal shape, but anteriorly with a large smooth unsclerotized gap between them. Otherwise as in alatae.

Type material.—*Holotype aptera*: Oregon, Marion County, Champoeg State Park, ex *Vancouveria hexandra* (Hook.) Morr. and Dcne., 2 August 1992, A.S. Jensen (USNM).

Paratype apterae: 1 same data as the holotype (OSU); 1 Oregon, Yamhill County, Dundee, ex *V. hexandra*, 1 September 1991, A.S. Jensen (BMNH); 1 Oregon, Benton County, McDonald State Forest, ex *V. hexandra*, 18 September 1991, A.S. Jensen (CNC); Washington, Thurston County, Maytown, ex *V. hexandra*, 30 May 1993, A.S. Jensen (USNM).

Paratype alatae: 3 Oregon, Benton County, McDonald State Forest, ex *V. hexandra*, 2 July 1991, A.S. Jensen (1 each to USNM, BMNH, OSU); 1 Washington, Thurston County, Maytown, ex *V. hexandra*, 30 May 1993, A.S. Jensen (CNC).

Paratype oviparae: 4 Oregon, Benton County, McDonald State Forest, ex *V. hexandra*, 9 November 1991, A.S. Jensen (1 each to: USNM, BMNH, CNC, OSU); 1 same data except the date: 30 October 1991 (OSU).

Paratype alate males: 1 Oregon, Benton County, McDonald State Forest, ex *V. hexandra*, 26 October 1993, A.S. Jensen (USNM); 3 same data except the date: 20

October 1993 (1 each to: CNC, BMNH, OSU).

Additional material.—Many apterae, and oviparae, and one male from Oregon, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species is both unusual and enigmatic. It is one of very few species of aphid known to specialize on Berberidaceae. *Vancouveria hexandra* (Hook.) Morr. and Dcne. is the only plant from which I have collected this species. Another herbaceous Berberidaceae that occurs in similar habitats, *Achlys triphylla*, hosts a related aphid, *M. tuberculaecephus*.

The life history of this species is still imperfectly known. I have collected all the morphs except the fundatrix, and have never collected the oviparae and males together. Therefore, I have not been able to confirm a holocycle. The fact that oviparae have been found on *Vancouveria* does not rule out heteroecy (e.g., *M. rhamnii*, Jensen et al. 1993). It is very probable, however, that the species is monoecious on *Vancouveria*.

I have collected this species in western Oregon and southwestern Washington. *V. hexandra* extends from the south end of the Puget trough into northern California, mostly between the Cascade Mountains and Coast Range Mountains, but also extends some distance east along the Columbia River. Two other species of *Vancouveria* grow in southwestern Oregon and northwestern California (Stearn, 1938). It is likely that the aphid lives wherever *V. hexandra* grows, and may also exploit the other two species of *Vancouveria*.

Remarks.—This species superficially resembles *M. violae* quite closely. It is recognizable on closer inspection by the more narrowly blunt to pointed dorsal setae, longer tarsi, and distinctly separate middle pair of gonapophyses (Fig. 50). The latter character state is unusual. This is the only species of Macrosiphini in which I have seen it so clearly demonstrated on a consistent

basis. This species is also unusual in that the male has a large unsclerotized gap between the claspers anteriorly. This character may be related to the separate gonapophyses in the females.

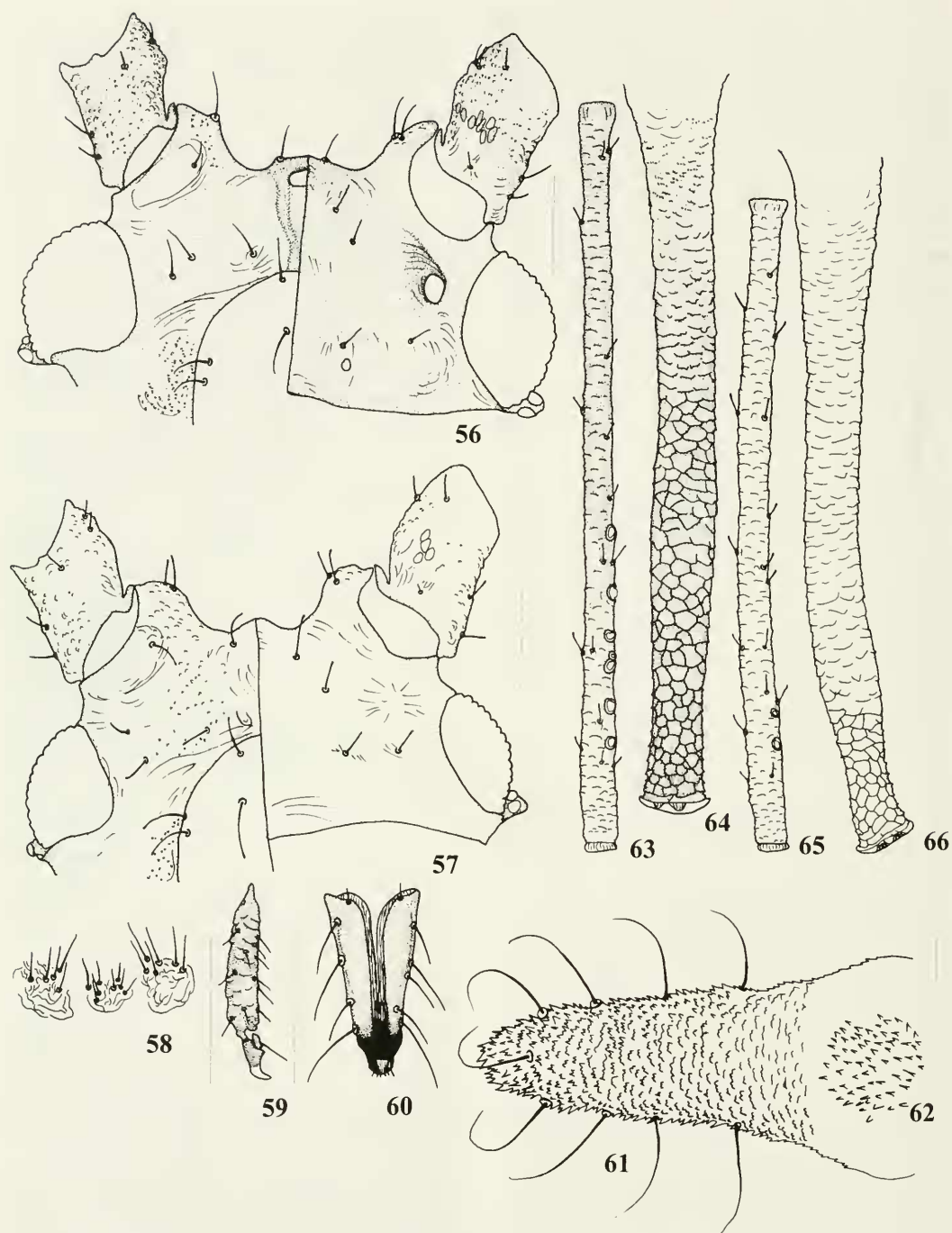
I have a few small collections of an enigmatic *Macrosiphum*, mostly from *Vaccinium*, that is similar to *M. vancouveriae*. The main differences are that the middle pair of gonapophyses are not distinctly separate, the dorsal setae are slightly capitate to blunt, and the pigmentation is more extensive in these enigmatic specimens.

***Macrosiphum violae* Jensen, new species**
(Figs. 56–66)

Apterae (31 specimens measured).—**Color:** When alive, very pale green. When macerated, extreme apices of a.s. III and IV sometimes dusky, apex of a.s. V and all of VI light brown to brown. Eyes with ocular tubercles brown, interfacetal spaces pale or dusky. Rostrum with segment III and u.r.s. dusky to light brown. Tips of tibiae usually light brown. Tarsi brown. Otherwise pale.

Morphology: Body length 2.17–3.32 mm. A.s. III 0.44–0.87 mm long; a.s. IV 0.41–0.65 mm long, 0.72–0.98 times a.s. III; a.s. V 0.42–0.60 mm long, 0.66–0.96 times a.s. III; a.s. VIa 0.18–0.28 mm long, 0.39–0.54 times a.s. V; a.s. VIb 1.03–1.36 mm long, 1.32–2.42 times a.s. III; a.s. III imbricated, with 0–3 sensoria basally (Fig. 65); longest seta on a.s. III 0.02–0.03 mm long, 0.47–0.77 times as long as basal width of segment; a.s. I rough medially, with numerous spinules ventrally and a few distinct spinules in middle dorsally (Fig. 57), with 2–4 setae laterally; a.s. II ornamented medially and ventrally. Ventral surface of head with a broad band of spinules extending from antennal tubercles to posterior margin of head, and with distinct patches of spinules on each side posteriorly (Fig. 57). Head sometimes with low, indistinct spinal tubercles. Antennal tubercles large, diverging, with 2–3 setae medially and 0–2 setae ventrally; longest seta 0.03–0.04 mm long and 0.77–1.23 times basal

width a.s. III. Setae on head and antennae slightly capitate to blunt. Rostrum reaching almost to metacoxae, u.r.s. 0.12–0.15 mm long and 0.94–1.26 times metatarsal II (greater than 1.0 in all but 2 specimens), with 7–12 accessory setae. Prothorax often with low lateral tubercles. Thorax with dorsal setae slightly capitate to blunt, sternal, coxal and usually trochantal setae pointed. Femora with setae blunt, no ventral ones dramatically longer than others; ornamentation extensive over distal two-thirds of femora dorsally and anteriorly, hardly less dense posteriorly as well, ornamentation essentially encircling entire femur; metafemora 0.76–1.26 mm long. Tibiae with basal setae slightly but distinctly capitate; mesotibiae with basal setae 0.02–0.04 mm long, apical setae 0.04–0.06 mm long; metatibiae 1.53–2.33 mm long. Tarsal segments I all with 3 setae; protarsal II with 3–4 pairs of dorsal setae (Fig. 59); metatarsal II 0.11–0.14 mm long. Abdominal tergum uniformly moderately sclerotic, often lightly wrinkled. Some of segments II–V usually with very small, low lateral tubercles. Dorsal setae slightly capitate to blunt, longest seta on tergites II–IV 0.02–0.03 mm long; ventral setae pointed. Siphunculi 0.47–0.87 mm long and 0.87–1.33 times a.s. III, with 5–10 rows reticulations, reticulated area often slightly constricted, imbrications more basad usually relatively faint and sparse, but becoming smaller, denser and spinulate toward base (Fig. 66). Cauda 0.23–0.46 mm long, with 7–12 setae, and ventral spinules large, acute, dense, mostly singles (Fig. 62); dorsal ornamentation composed of ribbed, multi-dentate tooth-like structures with short acute to blunt points, or sometimes with prominent mono- or bi-dentate structures with blunt tips, except toward base where the latter type of structure occurs (Fig. 61). Tergites VII and VIII often with 1 or more low, indistinct spinal tubercles; longest of the 6–11 setae on tergite VIII 0.04–0.07 mm long and 1.06–2.07 times basal width a.s. III. Middle pair gonapophyses fused (Fig. 58).



Figs. 56–66. *Macrosiphum violae*. 56, Head of alata. 57, Head of aptera. 58, Gonapophyses of aptera. 59, Protarsal II of aptera. 60, U.r.s. of aptera. 61, Cauda of aptera, dorsal surface. 62, Spinulation of ventral surface of cauda of aptera. 63, A.s. III of alata. 64, Siphunculus of alata. 65, A.s. III of aptera. 66, Siphunculus of aptera. All scale bars equal 0.10 mm.

Alatae (3 specimens measured).—*Color*: When alive, very pale green. When macerated, head brown, with antennal tubercles slightly paler, and areas around ocelli slightly darker. A.s. I brown, a.s. II dusky to light brown, remainder of antennae brown, except extreme base of a.s. III, which is pale. Rostrum with segment II dusky, III brown, and u.r.s. dark brown. Thorax with sclerotized plates dark brown. Coxae light brown. Femora dusky near base, becoming brown apically. Tibiae pale or dusky throughout except apical portion dark brown. Tarsi dark brown. Abdomen with large lateral sclerites on segments II–V, large pleural intersegmental muscle attachment plates on segments I–VI, spinal intersegmental muscle attachment plates very small, inconspicuous, all brown. Tergite I with a pair of small brown spots near spinal setae. Postsiphuncular sclerites, genital plate and sometimes small spinal patches on segments II–IV light brown to dusky. Siphunculi entirely brown, except extreme base, which is distinctly lighter brown. Cauda pale to light brown. Otherwise pale.

Morphology: Body length 2.17–3.32 mm. A.s. III 0.66–0.84 mm long; a.s. IV 0.61–0.69 mm long, 0.81–0.97 times a.s. III; a.s. V 0.52–0.62 mm long, 0.74–0.80 times a.s. III; a.s. VIa 0.21–0.25 mm long, 0.40–0.41 times a.s. V; a.s. VIb 1.21–1.30 mm long, 1.55–1.84 times a.s. III; a.s. III imbricated throughout, with 7–11 sensoria restricted to basal one half (Fig. 63); longest seta on a.s. III 0.03–0.04 mm long, 0.87–0.93 times basal width of segment; a.s. I densely ornamented medially, with sparse spinules dorsally and ventrally, about equal both sides (Fig. 56), with 2–3 setae laterally; a.s. II ornamented medially and ventrally. Venter of head almost completely smooth, but with a small patch of spinules posteriorly on each side, and sometimes with a few spinules on antennal tubercles (Fig. 56). Head with low, pale spinal tubercles located unusually far behind middle pair of posterior occipital setae. Antennal tubercles large, diverging, with 2 setae me-

dially and 1–2 setae ventrally; longest seta 0.03–0.04 mm long and 0.87–0.93 times basal width a.s. III. Setae on head and antennae slightly capitate to blunt. Rostrum reaching middle of mesothorax, u.r.s. 0.13–0.15 mm long and 0.97–1.19 times metatarsal II, with 8–12 accessory setae. Thoracic plates normal. Dorsal setae blunt, sternal, coxal, and trochantal setae pointed. Femora with setae narrowly blunt, none dramatically longer than others, ornamentation very dense and extensive dorsally and anteriorly over apical one half–two thirds, posterior surface with much sparser spinules covering about equal portion of femur; metafemora 1.07–1.26 mm long. Tibiae with basal setae slightly capitate to blunt, apical setae pointed; mesotibiae with basal setae 0.02–0.03 mm long, apical setae 0.04–0.05 mm long; metatibiae 2.12–2.52 mm long. Metatarsal II 0.12–0.14 mm long. Abdominal tergum membranous except sclerotized, pigmented areas described above. Segments II–V usually with lateral tubercles. Dorsal setae slightly capitate to blunt, ventral setae pointed; longest seta on tergites II–IV 0.02 mm long. Siphunculi 0.65–0.78 mm long and 0.91–1.00 times a.s. III, with 10–15 rows of reticulations, reticulated area slightly constricted, dense imbrications more basal, becoming ribbed, then spinulate toward base (Fig. 64). Cauda 0.33–0.36 mm long, with 9–10 setae, ventral and dorsal ornamentation essentially as in apterae. Tergites VII and VIII usually with 1 or more indistinct spinal tubercles; longest of the 6–7 setae on tergite VIII 0.04 mm long and 1.33–1.53 times basal width a.s. III. Middle pair gonapophyses fused. Otherwise as in apterae.

Oviparae (12 specimens measured).—*Color*: When alive, pale whitish green. When macerated, essentially as in aptera.

Morphology: Body length 2.14–2.78 mm. A.s. III 0.53–0.71 mm long; a.s. IV 0.37–0.63 mm long, 0.69–0.96 times a.s. III; a.s. V 0.41–0.61 mm long, 0.75–0.91 times a.s. III; a.s. VIa 0.21–0.27 mm long, 0.42–0.54 times a.s. V; a.s. VIb 1.02–1.22

mm long, 1.52–2.11 times a.s. III; a.s. III with 0–3 sensoria; longest seta on a.s. III 0.02 mm long, 0.52–0.70 times basal width of segment; a.s. I with 1–3 setae laterally. Antennal tubercles large, diverging, with 1–2 setae medially and 0–1 seta ventrally; longest seta 0.02–0.05 mm long and 0.72–1.44 times basal width a.s. III. Rostrum with u.r.s. 0.12–0.14 mm long and 0.97–1.29 times metatarsal II, with 6–12 accessory setae. Head otherwise as in apterae, except ventral surface of head and a.s. I and II sometimes less densely ornamented. Femora with setae blunt to pointed; ornamentation often much less extensive than in apterae, in such cases limited to anterior and dorsal surfaces, and not extending as far basad; metafemora 0.77–1.08 mm long. Tibiae with basal setae slightly capitate to blunt; mesotibiae with basal setae 0.02–0.03 mm long, apical setae 0.03–0.05 mm long; metatibiae 1.51–1.98 mm long, slightly swollen, and with numerous scent plaques in basal one half. Metatarsal II 0.11–0.13 mm long. Abdominal tergum membranous. Tergites VII and VIII usually without spinal tubercles, longest of the 7–13 setae on tergite VIII 0.05–0.07 mm long and 1.44–2.32 times basal width a.s. III. Otherwise as in apterae.

Alate Males (7 specimens measured).—**Color:** When alive, light reddish, with brown sclerotic areas. When macerated, head, antennae and rostrum essentially as in alatae. Sclerotized thoracic plates dark brown. Coxae dusky. Femora dusky near base, becoming light brown toward apex. Tibiae mostly pale, with apex brown. Tarsi entirely brown. Abdomen with lateral sclerites on segments II–VII brown. Pleural intersegmental muscle attachment plates on tergites I–V brown, connected across spinal region by brown cross bands. Postsiphuncular sclerites, and incomplete cross bands on tergites VI–VIII light brown. Siphunculi brown, except extreme base, which is paler. Cauda brown. Claspers brown. Otherwise pale.

Morphology: Body length 2.40–3.16

mm. A.s. III 0.73–0.89 mm long; a.s. IV 0.65–0.78 mm long, 0.83–0.96 times a.s. III; a.s. V 0.63–0.77 mm long, 0.75–0.94 times a.s. III; a.s. VIa 0.25–0.29 mm long, 0.36–0.44 times a.s. V; a.s. VIb 1.35–1.50 mm long, 1.59–2.03 times a.s. III; a.s. III with 40–51 sensoria, a.s. IV with 9–39 and a.s. V with 15–24 secondary sensoria scattered over full lengths of segments; a.s. I with 1–3 lateral setae. Antennal tubercles large, diverging, with 2 setae medially and 1–2 ventrally; longest seta 0.03–0.04 mm long and 0.96–1.67 times basal width a.s. III. Setae on head and antennae more or less pointed. Rostrum with u.r.s. 0.13–0.14 mm long, with 8–10 accessory setae. Thorax with dorsal, sternal, coxal, and trochantal setae pointed. Femora with setae pointed, ornamentation moderately dense and extensive dorsally and anteriorly over about apical one half, posterior surface with few scattered spinules covering about equal portion of femur; metafemora 0.92–1.21 mm long. Tibiae with basal setae pointed; mesotibiae with basal setae 0.02–0.03 mm long, apical setae 0.03–0.04 mm long; metatibiae 1.78–2.36 mm long. Metatarsal II 0.12–0.14 mm long. Abdominal tergum membranous except sclerotized, pigmented areas described above. Segments II–V sometimes with small lateral tubercles. Dorsal setae pointed, longest seta on tergites II–IV 0.02–0.04 mm long. Siphunculi 0.44–0.58 mm long and 0.59–0.69 times a.s. III, with 5–10 rows of reticulations, reticulated area slightly constricted, dense imbrications more basad. Cauda 0.17–0.23 mm long, with 7–9 setae. Tergites VII and VIII often with 1 or more indistinct spinal tubercles; longest of 7–9 setae on tergite VIII 0.05–0.06 mm long and 1.43–1.92 times basal width a.s. III. Claspers normal, with little or no gap between their bases anteriorly. Otherwise as in alatae.

Type material.—*Holotype aptera:* Washington, Whatcom County, Mt. Baker, ex *Viola glabella* Nutt., 30 May 1993, A.S. Jensen (USNM).

Paratype apterae: 2 Oregon, Benton

County, Cordley Hall Lab, ex *V. glabella*, 17 May 1993, A.S. Jensen (1 USNM, 1 CNC); 1 Oregon, Marion County, Champoe Park, ex *V. glabella*, 2 August 1992, A.S. Jensen (BMNH); 1 Oregon, Benton County, McDonald State Forest, ex *V. glabella*, 28 September 1993, A.S. Jensen (OSU). *Paratype alatae*: 3 Oregon, Benton County, McDonald State Forest, ex *V. glabella*, 5 June 1991, A.S. Jensen (1 USNM, 1 CNC, 1 BMNH).

Paratype oviparae: 2 Oregon, Linn County, Santiam Pass, ex *V. glabella*, 24 September 1994, A.S. Jensen (1 USNM, 1 CNC); 1 Oregon, Benton County, McDonald State Forest, ex *V. glabella*, 26 October 1993, A.S. Jensen (OSU); 1 Oregon, Wallowa County, 5 Mi. N. of Tollgate, ex *V. glabella*, 29 August 1992, A.S. Jensen (BMNH).

Paratype alate males: 2 Oregon, Benton County, McDonald State Forest, ex *V. glabella*, 26 October 1993, A.S. Jensen (1 USNM, 1 BMNH); 1 same data except the date: 23 October 1992 (CNC).

Additional material.—Many apterae and oviparae, and a few males from Oregon, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species is monoecious holocyclic on its host *Viola glabella* Nutt. Egg hatch in the Corvallis area occurs as the leaves are unfolding in March. Fundatrices mature by mid-April. Aphid numbers reach their peak during flowering in late-emerging plants and fruiting in earlier-emerging plants. Apterae reproduce slowly throughout the summer, rarely producing alatae. Sexuales are produced in September and October.

Attempts to transfer this species to *Vancouveria hexandra* and *Viola sempervirens* Greene were both unsuccessful. The transfer to *V. sempervirens* was done in the laboratory, where after one day the transferred fundatrix left the plant, and its single deposited nymph was dead. Transfers to *V. hexandra* were attempted in the field, where

adult females survived for several days, but did not settle or reproduce.

I have collected this species from northwestern Washington, northeastern Oregon and western Oregon from the Cascade Mountains to the Coast Range Mountains. The distribution of *Viola glabella* is from Alaska south to northern California, on both sides of the Cascades, east to Montana and also in northeastern Asia (Hitchcock and Cronquist 1973). It may be that the aphid has a similar distribution.

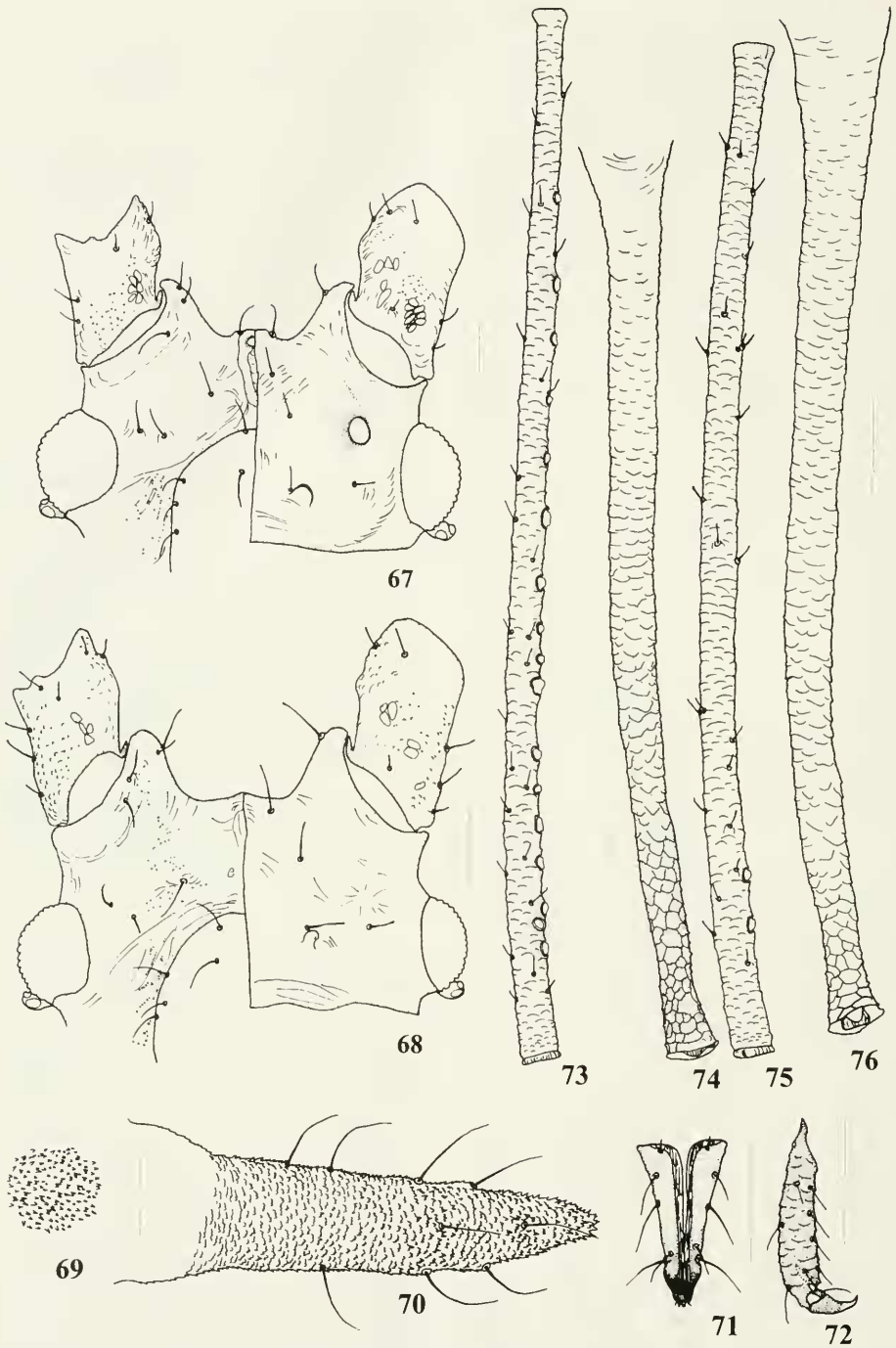
Remarks.—This species most resembles *M. vancouveriae*, but is easily separated from it by its shorter tarsi, more capitate dorsal setae, more densely ornamented femora, fewer setae laterally on a.s. I, and fused middle pair of gonapophyses.

Macrosiphum violae is the only North American *Macrosiphum* known from *Viola* or any Violaceae, with the probable exception of *M. euphorbiae*. The latter species has a membranous tergum in apterae, and many more sensoria on a.s. III in alatae than is the case in *M. violae*.

***Macrosiphum willamettense* Jensen,
new species
(Figs. 67–76)**

Apterae (22 specimens measured).—*Color*: When alive, very pale greenish white, nymphs with faint granular waxy sculpture, adults shining. When macerated, tips of a.s. III–V dusky to brown, a.s. VI with area of primary sensoria and beyond usually dusky to brown. Rostrum with u.r.s. dusky basally, brown at tip. Tips of tibiae gradually darkening from dusky to brown. Tarsi entirely brown. Otherwise pale.

Morphology: Body length 2.32–3.48 mm. A.s. III 0.84–1.25 mm long; a.s. IV 0.68–1.22 mm long, 0.80–1.04 times a.s. III; a.s. V 0.67–0.97 mm long, 0.73–0.91 times a.s. III; a.s. VIa 0.25–0.33 mm long, 0.31–0.40 times a.s. V; a.s. VIb 1.13–1.62 mm long, 1.09–1.54 times a.s. III; a.s. III imbricated throughout, with 1–6 sensoria limited to about basal one third (Fig. 75); longest seta on a.s. III 0.02 mm long, 0.52–



Figs. 67-76. *Macrosiphum willamettense*. 67, Head of alata. 68, Head of aptera. 69, Spinulation of ventral surface of cauda of aptera. 70, Cauda of aptera, dorsal surface. 71, Protarsal II of aptera. 72, U.r.s. of aptera. 73, A.s. III of alata. 74, Siphunculus of alata. 75, A.s. III of aptera. 76, Siphunculus of aptera. All scale bars equal 0.10 mm.

0.55 times basal width a.s. III; a.s. I almost smooth medially, with a strong patch of ornamentation basoventrally and a few spinules dorsally (Fig. 68), with 1–4 setae laterally; a.s. II ornamented ventrally, imbrications often concentrated apically. Ventral surface of head with at least a few spinules behind antennal tubercles, sometimes with a distinct narrow band extending from antennal tubercles to mouthparts, and always with at least a few spinules on each side posteriorly (Fig. 68). Head often with spinal tubercles, sometimes large and prominent. Antennal tubercles large, diverging, with 2–3 setae medially and 1–2 setae ventrally; longest seta 0.04–0.05 mm long and 0.80–1.07 times basal width a.s. III; median prominence slightly developed. Setae on head and antennae slightly capitate to blunt. Rostrum reaching to about mesocoxae, u.r.s. 0.11–0.13 mm long and 0.74–0.97 times metatarsal II, with 4–9 accessory setae; part of u.r.s. beyond the 3 pairs of primary setae appearing unusually long and rounded. Pronotum with large lateral and sometimes spinal tubercles. Dorsal setae very slightly capitate to narrowly blunt, ventral setae narrowly blunt to more or less pointed, coxal and trochantal setae pointed. Femora with setae narrowly blunt, ornamentation mostly anterior, most dense anterioapicoventrally, but roughly ornamented and wrinkled dorsally, and with a few spinules posteriorly, ornamentation extending through more than apical one half; metafemora 1.04–1.72 mm long. Tibiae with basal setae slightly capitate to blunt; mesotibiae with basal setae 0.02–0.04 mm long, apical setae 0.03–0.05 mm long; metatibiae 2.06–3.29 mm long. All first tarsal segments with 3 setae; protarsal II with 2, sometimes 3, pairs of dorsal setae (Fig. 72); metatarsal II 0.13–0.17 mm long. Abdominal tergum uniformly, sometimes heavily sclerotized, often lightly wrinkled throughout. Segments II–V and sometimes I and VII with small to large, prominent lateral tubercles. Dorsal setae blunt, longest seta on tergites II–IV 0.02–0.04 mm long; ven-

tral setae finely pointed. Siphunculi 0.68–1.24 mm long and 0.80–1.04 times a.s. III, with about 5 rows of reticulations, with imbrications more basal, and much fainter and smaller toward base where they are ribbed and spinulate. Cauda 0.33–0.58 mm long, with 7–9 setae; ventral spinules mostly small, dense, a mixture of singles, doubles and triples (Fig. 69); dorsal ornamentation composed of dense, broad, spinulate tooth-like structures, about 10 across width of cauda, but sometimes these are partially fused into horizontal bands (Fig. 70). Tergites VII and VIII and sometimes VI with prominent spinal tubercles, sometimes more than 2 on each segment; longest of the 6–10 setae on tergite VIII 0.04–0.06 mm long, 0.92–1.50 times basal width a.s. III. Middle pair gonapophyses more or less fused.

Alatae (4 specimens measured).—*Color*: When alive, very pale greenish white. When macerated, a.s. III dusky, except pale at base and slightly darker near a few of the sensoria and at extreme apex; a.s. IV slightly dusky throughout, with apex light brown; a.s. V dusky, except brown at extreme base and apex; a.s. VI with base dusky, becoming brown before primary sensoria and remainder entirely brown. Head with very small dusky rings around ocelli. Ocular tubercles light brown. Rostrum with u.r.s. dusky, apex brown. Tips of tibiae and all of tarsi brown. Siphunculi with about apical one half dusky. Otherwise pale.

Morphology: Body length 2.90–3.12 mm. A.s. III 0.96–1.22 mm long; a.s. IV 0.94–1.15 mm long, 0.90–1.07 times a.s. III; a.s. V 0.83–0.96 mm long, 0.79–0.92 times a.s. III; a.s. VIa 0.25–0.32 mm long, 0.27–0.37 times a.s. V; a.s. VIb 1.49–1.59 mm long, 1.31–1.56 times a.s. III; a.s. III distinctly imbricated, with 12–17 sensoria scattered over almost entire length of segment (Fig. 73); longest seta on a.s. III 0.02 mm long and 0.45–0.53 times basal width a.s. III; a.s. I with median surface slightly wrinkled, with a cluster of spinules ventrobasally and a few spinules dorsally, with 2 setae laterally (Fig. 67); a.s. II with distinct

imbrications ventrally, less distinct near base, and with a few imbrications dorsoapically. Ventral surface of head smooth, except with a few spinules at posterior margin on each side (Fig. 67). Head with prominent spinal tubercles. Antennal tubercles large, diverging, smooth, with 2 setae medially, and 1 seta ventrally. Setae on head and antennae narrowly to thickly blunt. Rostrum reaching almost to middle of mesothorax, u.r.s. 0.12 mm long and 0.85–0.89 times metatarsal II, with 5–6 accessory setae. Thoracic plates normal. Dorsal setae narrowly blunt, ventral and coxal setae finely pointed, trochantal setae narrowly blunt to more or less pointed. Femora with setae blunt, ornamentation extensive ventrally, anteriorly and dorsally over about apical one half, and with a few spinules posteriorly; metafemora 1.30–1.49 mm long. Tibiae with basal setae blunt to slightly capitate; mesotibiae with basal setae 0.02–0.03 mm long, apical setae 0.03–0.04 mm long; metatibiae 2.71–3.05 mm long. Metatarsal II 0.15–0.16 mm long. Abdominal tergum membranous, except with small lateral sclerites on segments II–V, much smaller lateral sclerites on segment I, small pleural intersegmental muscle attachment plates on segments I–VII, and large, spinulate post-siphuncular sclerites. Segments I–V with prominent lateral tubercles. Dorsal setae slightly capitate to blunt, longest seta on tergites II–IV 0.03 mm long; ventral setae narrowly blunt to more less pointed. Siphunculi 0.80–0.99 mm long and 0.76–0.87 times a.s. III, otherwise essentially as in apterae, except reticulations extending farther basad, about 10 rows total, the more basal ones faint (Fig. 74). Cauda 0.42–0.48 mm long, with 8–9 setae. Tergites VII and VIII with distinct spinal tubercles; longest of the 7–10 setae on tergite VIII 0.05–0.06 mm long and 1.11–1.39 times basal width a.s. III. Otherwise as in apterae.

Oviparae (4 specimens measured).—*Color*: When alive, very pale greenish white. When macerated, essentially as in apterae.

Morphology: Body length 2.37–2.96

mm. A.s. III 0.80–1.00 mm long; a.s. IV 0.68–0.86 mm long, 0.83–0.87 times a.s. III; a.s. V 0.64–0.78 mm long, 0.77–0.81 times a.s. III; a.s. VIa 0.26–0.32 mm long, 0.37–0.44 times a.s. V; a.s. VIb 1.15–1.24 mm long, 1.24–1.49 times a.s. III; a.s. III imbricated throughout, with 1 sensorium near base; a.s. I with 1–3 setae laterally. Head with spinal tubercles, these sometimes very large and prominent. Setae on head and antennae blunt to narrowly blunt. Rostrum with u.r.s. 0.12 mm long, 0.85–0.89 times metatarsal II, with 5–7 accessory setae. Thoracic dorsal setae blunt. Femora with setae narrowly blunt, ornamentation sometimes quite reduced, some femora almost smooth; metafemora 1.10–1.35 mm long. Metatibiae 2.02–2.44 mm long, with basal one half slightly swollen, with many scent plaques scattered over this area and extending somewhat into apical one half. Metatarsal II 0.13–0.14 mm long. Abdominal tergum membranous. Segments II–V with small, prominent lateral tubercles. Dorsal setae blunt to more or less pointed. Siphunculi 0.72–0.92 mm long and 0.86–0.92 times a.s. III. Cauda 0.28–0.34 mm long, with 10–15 setae. Tergite VIII with 10–11 setae, the longest of which is 0.06 mm long and 1.29–1.45 times basal width a.s. III. Otherwise more or less as in apterae.

Type material.—*Holotype aptera*: Oregon, Linn County, Tangent, ex *Spiraea douglasii* Hook., 7 June 1994, A.S. Jensen.

Paratype apterae: 3 same data as holotype (1 USNM, 1 BMNH, 1 OSU); 2 Canada, British Columbia, UBC Campus, ex *S. douglasii*, 29 May 1993, A.S. Jensen (1 CNC, 1 BMNH); 3 Oregon, Marion County, Champoeg Park, ex *S. douglasii*, 2 August 1992, A.S. Jensen (OSU); 2 Oregon, Linn County, Tangent Road, ex *S. douglasii*, 18 September 1993, A.S. Jensen (OSU); 1 same data except the date: 20 September 1993 (CNC); 11 Oregon, Albany, ex *S. douglasii*, 26 May 1941, J. Schuh (UCB).

Paratype alata: 1 same data as holotype (USNM); 3 Oregon, Albany, ex *S. douglasii*, 26 May 1941, J. Schuh (UCB).

Paratype oviparae: 3 OREGON, Linn County, 6 mi. S. Albany, ex *S. douglasii*, 26 October 1993, A.S. Jensen (1 USNM, 1 CNC, 1 BMNH).

Additional material.—Many apterae and a few oviparae from Oregon, mounted in Hoyer's medium, in the author's collection, and at OSU.

Biology and distribution.—This species is monoecious holocyclic on its host *Spiraea douglasii* Hook. It is often difficult to find, even on plants that are infested. The aphids seem to prefer the freshest growth of the plants. This fresh growth is often on the water sprouts around the edges of the plant patch. The plant is an inhabitant of wet places like swamps and wet meadows, but in practice the commonest place to see it is in roadside hedgerows. *Macrosiphum willametense* sometimes lives together on the same plants with *Illinoia spiraeae* (MacGillivray).

The known distribution of this species is British Columbia, Washington (recent collections by the author and Keith Pike, Washington State University, Prosser) and Oregon. The distribution of the host plant is southern Alaska south to northern California, on the coast and inland to southeastern British Columbia and north and central Idaho and northeastern Oregon (Hitchcock and Cronquist 1973).

Remarks.—Three species with which this one could most easily be confused are also monoecious shrub-feeding species, *M. holodisci*, *M. occidentalis* and *M. parvifolii*. All four species share the elongate, pale body form, with pale antennae with dark joints, short u.r.s., long siphunculi and cauda, etc. *M. willametense* can be separated from these species by its fewer caudal setae (7–9, vs. 9 or more in the other species), its a.s. V shorter than a.s. IV (the other 3 species often have a.s. V longer than a.s. IV), and the peculiar shape of the u.r.s. (Fig. 71). In addition, this species has cylindrical siphunculi and the other three species often have some swelling in the siphunculus basad of the reticulated area.

This is the only North American *Macrosiphum* that feeds specifically on *Spiraea*. The polyphagous *M. euphorbiae* can sometimes be found on *Spiraea*, as can the Palearctic species *Macrosiphum cholodkovskyi* Mordvilko. *Macrosiphum willametense* differs from both of these by its white color, pale antennae with banded joints, sclerotized tergum in apterae, and many other characters.

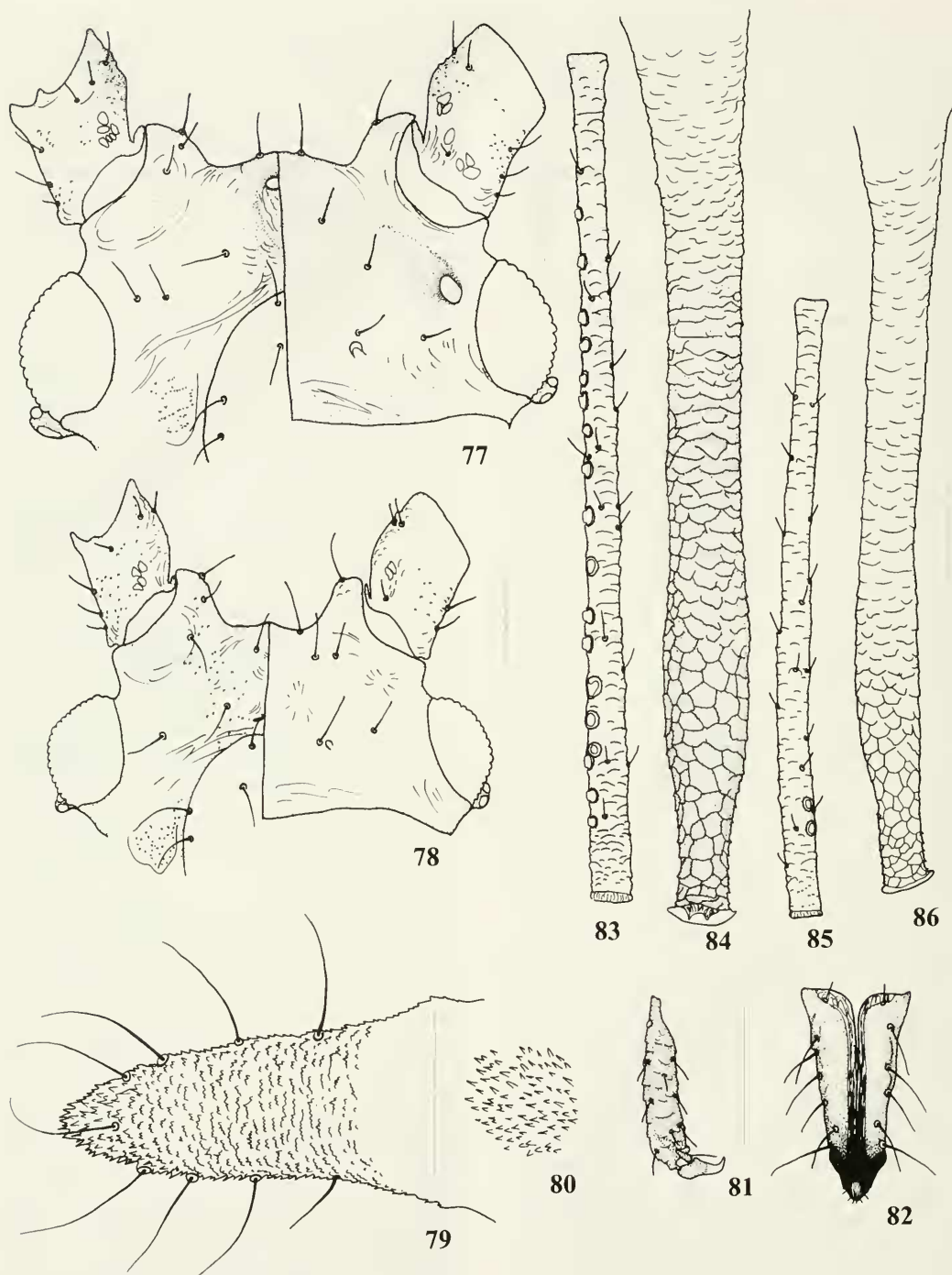
Illinoia spiraeae can easily be separated from *M. willametense* by the fact that the former species has slightly swollen, shorter siphunculi, 4 or 5 setae on tarsal segments I, with 4th and 5th setae placed on the side of tarsal I, and many other details.

The species is named for the area from which I originally collected it, the flood plain of the Willamette River in western Oregon.

***Macrosiphum wilsoni* Jensen,
new species
(Figs. 77–86)**

Fundatrices (5 specimens measured).—**Color:** When alive, very pale yellow. When macerated, entirely pale except ocular tubercles brown, tip of u.r.s. brown, a.s. VI dusky, tips of tibiae dusky, and tarsi brown.

Morphology: Body length 3.56–3.77 mm. A.s. III 0.67–0.76 mm long; a.s. IV 0.45–0.57 mm long, 0.66–0.83 times a.s. III; a.s. V 0.52–0.60 mm long, 0.70–0.91 times a.s. III; a.s. VIa 0.26–0.31 mm long, 0.47–0.52 times a.s. V; a.s. VIb 0.84–1.03 mm long, 1.16–1.50 times a.s. III; a.s. III lightly imbricated, with 1–2 sensoria basally; longest seta on a.s. III 0.02–0.03 mm long and 0.38–0.63 times basal width a.s. III; a.s. I with light ornamentation medially, and sometimes a few spinules in middle ventrally, with 2–4 setae laterally; a.s. II lightly ornamented medially. Ventral surface of head with a few spinules on antennal tubercles, and with small or large patches of spinules at posterior of head. Head with spinal tubercles, when present, low and broad. Antennal tubercles somewhat



Figs. 77-86. *Macrosiphum wilsoni*. 77, Head of alata. 78, Head of aptera. 79, Cauda of aptera, dorsal surface. 80, Spinulation of ventral surface of cauda of aptera. 81, Protarsal II of aptera. 82, U.r.s. of aptera. 83, A.s. III of alata. 84, Siphunculus of alata. 85, A.s. III of aptera. 86, Siphunculus of aptera. All scale bars equal 0.10 mm.

low, with 0–2 setae medially, and 0–2 setae ventrally; longest seta 0.03–0.04 mm long and 0.75–0.88 times basal width a.s. III; median prominence low and broad. Setae on head and antennae slightly capitate to blunt. Rostrum reaching to about mesocoxae, u.r.s. 0.13–0.14 mm long and 1.03–1.13 times metatarsal II, with 6–9 accessory setae. Thoracic tergal setae slightly capitate to blunt, sternal, coxal and trochantal setae finely pointed. Femora with setae more or less blunt to pointed, a few ventral ones somewhat longer than others; ornamentation composed of small, dense nodules, mostly limited to near tip, ventrally, anteriorly and dorsally; metafemora 1.16–1.29 mm long. Tibiae with basal setae slightly capitate to blunt; metafemora with basal setae 0.02–0.03 mm long, apical setae 0.04 mm long; metatibiae 2.16–2.33 mm long. First tarsal segments with 3 setae; protarsal II with 3 pairs dorsal setae; metatarsal II 0.12–0.13 mm long. Abdominal tergum lightly, uniformly sclerotic, sometimes slightly wrinkled. At least some of segments II–V with low lateral tubercles. Dorsal setae capitate to blunt, the longest seta on tergites II–IV 0.03 mm long; ventral setae finely pointed or distinctly narrowly blunt. Siphunculi 0.88–1.09 mm long and 1.20–1.57 times a.s. III, with 5–10 rows of reticulations, fine spinulate imbrications basad of these. Cauda 0.31–0.34 mm long, with 9–11 setae; ventral spinules usually rather dense, mostly single, moderate in size; dorsal ornamentation composed of small, prominent, ribbed, nodulose structures about 10 across width of cauda. Tergites VII and VIII sometimes with a trace of a spinal tubercle; longest of 5–9 setae on tergite VIII 1.00–1.13 times basal width a.s. III. Middle pair gonapophyses fused.

Apteræ (21 specimens measured).—*Color*: When alive, pale yellowish white. When macerated, as in fundatrices.

Morphology: Body length 2.22–3.84 mm. A.s. III 0.60–0.86 mm long; a.s. IV 0.51–0.76 mm long, 0.74–0.97 times a.s. III; a.s. V 0.50–0.70 mm long, 0.69–0.88

times a.s. III; 0.20–0.29 mm long, 0.32–0.44 times a.s. V; a.s. VIb 1.04–1.47 mm long, 1.32–2.04 times a.s. III; a.s. III with 1–10 sensoria (Fig. 85) and with longest seta 0.02–0.03 mm long, 0.50–0.86 times basal width a.s. III; a.s. I with light ornamentation medially and ventrolaterally, and sometimes a few spinules in middle dorsally (Fig. 78), with 2–4 setae laterally. Head often with small, low spinal tubercles. Antennal tubercles medium-sized, with 1–3 setae medially, and 1 seta ventrally; longest seta 0.03–0.05 mm long and 0.81–1.31 times basal width a.s. III. Setae on head and antennae capitate to blunt. Rostrum reaching mesocoxae, u.r.s. 0.12–0.14 mm long and 1.00–1.21 times metatarsal II, with 7–11 accessory setae. Mesofemora with basal setae 0.02–0.04 mm long, apical setae 0.03–0.05 mm long. Metafemora 0.88–1.38 mm long. Metatibiae 1.82–2.69 mm long. Tarsal segments I rarely with 4 setae, there being an additional lateral seta in such cases; protarsal II normally with 3 pairs dorsal setae, but sometimes with 2 pairs (Fig. 81); metatarsal II 0.11–0.14 mm long. Abdominal tergum moderately sclerotic, somewhat wrinkled. Siphunculi 0.72–1.11 mm long and 0.97–1.39 times a.s. III, slightly swollen basad of reticulated area (Fig. 86). Cauda 0.23–0.40 mm long, with 7–10 setae; ventral spinules usually rather dense, mostly single, moderate in size (Fig. 80); dorsal ornamentation composed of small, prominent, ribbed, spinulose or nodulose structures about 5–10 across width of cauda (Fig. 79). Tergites VII and VIII usually with low spinal tubercles or traces of them; longest of 6–12 setae on tergite VIII 1.25–2.00 times basal width a.s. III. Otherwise as in fundatrices.

Alatae (10 specimens measured).—*Color*: When alive, pale yellowish, with sclerotized areas distinctly brown. When macerated, head dusky to brown, darker in areas surrounding and between ocelli. A.s. I dusky to brown medially, a.s. VI dusky throughout. Eyes with ocular tubercles brown, and interfacetal spaces dusky. Ros-

tral segment III slightly dusky, u.r.s. dusky to light brown. Mesothorax uniquely pigmented, with disc of mesonotum pale to dusky, with its anterior edge and small triangular sclerite in middle of anterior portion dark brown; pleurites and sternites dusky to brown; or sometimes all of mesothorax brown. Femora with about apical one half dusky to light brown. Ends of tibiae and all of tarsi brown. Abdominal tergum with large lateral sclerites on segments II–IV, small lateral sclerites on segments I and V, large pleural intersegmental muscle attachment plates on segments I–V and sometimes cross bands on some or all of segments I–V brown, with anterior lateral sclerites often darker than other areas. Large postsiphuncular sclerites and small pleural intersegmental muscle attachment plates on segment VI dusky. Siphunculi dusky to light brown throughout, except extreme base, which is pale. Cauda dusky. Otherwise pale.

Morphology: Body length 2.64–3.88 mm. A.s. III 0.74–0.93 mm long; a.s. IV 0.66–0.88 mm long, 0.81–1.04 times a.s. III; a.s. V 0.61–0.75 mm long, 0.76–0.86 times a.s. III; a.s. VIa 0.22–0.28 mm long, 0.33–0.41 times a.s. V; a.s. VIb 1.10–1.34 mm long, 1.22–1.61 times a.s. III; a.s. III lightly imbricated, with 13–21 sensoria scattered over almost entire length, usually with a small gap apically (Fig. 83); longest seta on a.s. III 0.02–0.03 mm long and 0.53–0.73 times basal width a.s. III; a.s. I lightly spinulate, with a few medially and sometimes a few toward lateral edge (Fig. 77), with 1–4 setae laterally; a.s. II ornamented ventrally and medially. Ventral surface of head smooth except small patches of spinules on each side of posterior edge (Fig. 77). Head usually with medium-sized spinal tubercles. Antennal tubercles moderately large, with 2–4 setae medially, and 1–2 setae ventrally; longest seta 0.03–0.04 mm long and 0.75–1.06 times basal width a.s. III. Setae on head and antennae slightly capitate to blunt. Rostrum nearly reaching mesocoxae, u.r.s. 0.13–0.15 mm long and

1.00–1.13 times metatarsal II, with 6–11 accessory setae. Thoracic plates normal. Dorsal setae slightly capitate to narrowly blunt, sternal and coxal setae finely pointed, trochantal pointed or blunt. Femora with setae blunt to more or less pointed; ornamentation more or less encircling femora, except somewhat lighter posteriorly, and extending more toward base on dorsum of femur; metafemora 1.09–1.37 mm long. Tibiae with basal setae slightly capitate to blunt; mesotibiae with basal setae 0.02–0.03 mm long, apical setae 0.03–0.04 mm long; metatibiae 2.28–2.72 mm long. Tarsal segments I with 3 or 4 setae; protarsal II with 2 or 3 pairs dorsal setae; metatarsal II 0.12–0.14 mm long. Abdominal tergum membranous except pigmented sclerites described above, and narrow pale cross bands on tergites VII and VIII. Segments II–V usually and sometimes I with small to large lateral tubercles. Dorsal setae slightly capitate to blunt, longest seta on tergites II–IV 0.03–0.04 mm long; ventral setae finely pointed or narrowly blunt. Siphunculi 0.69–1.09 mm long and 0.92–1.22 times a.s. III, with about 7 rows reticulations in apical constricted part, sometimes also with large, less distinct reticulations extending mostly through swollen part, with dense smooth and ribbed imbrications extending mostly to base (Fig. 84). Cauda 0.26–0.38 mm long, with 7–10 setae; ventral spinules, small, somewhat dense, mostly single; dorsal ornamentation composed of 5–10 small, irregular, ribbed or spinulate structures, sometimes quite small or partially fused across width of cauda. Tergites VII and VIII usually with low spinal tubercles, or traces thereof; longest of 5–8 setae on tergite VIII 0.05–0.06 mm long and 1.25–1.53 times basal width a.s. III. Middle pair gonapophyses fused.

Oviparae (10 specimens measured).—*Color:* When alive, unknown, probably whitish yellow. When macerated, essentially as in fundatrices.

Morphology: Body length 2.25–3.59 mm. A.s. III 0.63–0.78 mm long; 0.50–0.66

mm long, 0.74–0.94 times a.s. III; a.s. V 0.53–0.68 mm long, 0.76–0.89 times a.s. III; a.s. VIa 0.20–0.26 mm long, 0.36–0.44 times a.s. V; a.s. VIb 1.00–1.37 mm long, 1.41–2.08 times a.s. III; a.s. III with 1–5 sensoria; longest seta on a.s. III 0.02–0.03 mm long and 0.53–0.75 times basal width a.s. III; a.s. I with light ornamentation medially, and sometimes a few spinules in middle ventrally or lateroventrally, with 2–3 setae laterally; a.s. II lightly ornamented medially and some ventrally. Ventral surface of head with a few spinules on antennal tubercles or middle of head. Occiput more or less smooth, with 3–4 setae in posterior row. Antennal tubercles somewhat low, with 2–3 setae medially, and 0–1 seta ventrally; longest seta 0.03–0.04 mm long, 0.81–1.07 times basal width a.s. III. Rostrum with u.r.s. 0.12–0.14 mm long and 0.97–1.07 times metatarsal II, with 7–12 accessory setae. Femora with ornamentation as in fundatrices, except limited more toward tip; metafemora 0.96–1.25 mm long. Metatibiae slightly swollen, with numerous scent plaques scattered to about beginning of apical pigmented part, 1.82–2.30 mm long. Metatarsal II 0.11–0.14 mm long. Abdominal tergum membranous. Siphunculi 0.73–1.04 mm long and 1.11–1.60 times a.s. III, with about 5 rows of reticulations, fine spinulate imbrications basad of these. Cauda 0.23–0.28 mm long, with 7–9 setae. Tergites VII and VIII sometimes with low spinal tubercles; longest of 9–14 setae on tergite VIII 0.05–0.08 mm long and 1.33–1.88 times basal width a.s. III. Otherwise more or less as in fundatrices.

Alate males (8 specimens measured).—

Color: When alive, unknown. When macerated, head entirely brown, with areas around ocelli somewhat darker. Antennae with segment I light brown to brown, a.s. II dusky to light brown, a.s. III slightly dusky to light brown, a.s. IV more or less pale to concolorous with a.s. III, a.s. V–VI dusky to light brown. Eyes with ocular tubercles brown. Rostrum with segment III dusky, tip of u.r.s. brown. Prothorax uni-

formly brown, mesothoracic sclerites dark brown. Femora mostly dusky, slightly darker apically. Apex of tibiae and all of tarsi light brown to brown. Abdomen with large lateral sclerites on segments II–IV, smaller lateral sclerites on segments I, V, and VII, large postsiphuncular sclerites, broad cross bands on segments I–V and VII–VIII, a round central sclerite on segment VII, and pairs of large ventrolateral sclerites all brown. Siphunculi uniformly dusky to brown. Cauda, anal plate and claspers brown. Otherwise pale.

Morphology: Body length 2.60–2.94 mm. A.s. III 0.85–1.01 mm long; a.s. IV 0.74–0.85 mm long, 0.78–0.95 times a.s. III; a.s. V 0.70–0.88 mm long, 0.74–1.00 times a.s. III; a.s. VIa 0.24–0.28 mm long, 0.29–0.35 times a.s. V; a.s. VIb 1.36–1.60 mm long, 1.44–1.72 times a.s. III; a.s. III with 38–60 sensoria scattered over entire length, a.s. IV with 0–9 sensoria, when present, placed anywhere on segment, a.s. V with 13–24 secondary sensoria concentrated more toward tip, leaving a gap at base; longest seta on a.s. III 0.02–0.03 mm long, 0.5–0.67 times basal width a.s. III; a.s. I with 2–4 setae laterally. Ventral surface of head smooth except small patches of spinules sometimes on each side of posterior edge. Head with small and prominent or large and low spinal tubercles usually present. Antennal tubercles moderately large, with 1–3 setae medially, and 0–1 seta ventrally; longest seta 0.03–0.04 mm long and 0.80–1.00 times basal width a.s. III. Setae on head and antennae more or less pointed. Rostrum reaching to about middle of mesothorax, u.r.s. 0.12–0.14 mm long and 1.00–1.17 times metatarsal II, with 6–9 accessory setae. All thoracic setae finely pointed. Femora with setae pointed; ornamentation quite variable, from very similar to fundatrix, to extensive as in alatae; metafemora 1.01–1.13 mm long. Tibiae with basal setae slightly blunt to pointed; metatibiae 2.04–2.24 mm long. Metatarsal II 0.11–0.13 mm long. Abdominal tergum membranous except pigmented sclerites de-

scribed above. Dorsal and ventral setae pointed. Siphunculi 0.55–0.74 mm long and 0.59–0.77 mm long, much as in alatae, except no swelling present. Cauda 0.15–0.20 mm long, with 7–9 setae. Tergites VII and VIII sometimes with a low spinal tubercle, or traces thereof; longest of 5–7 setae on tergite VIII 0.05–0.07 mm long and 1.25–1.73 times basal width a.s. III. Spinal areas anterior to siphunculi with spinules, especially on tergites IV and V. Claspers normal, with no smooth gap between them anteriorly. Otherwise as in alatae.

Type material.—*Holotype aptera*: Oregon, Marion County, Champoeg Park, ex *Disporum hookeri* (Torr.) Nicholson, 2 August 1992, A.S. Jensen (USNM).

Paratype fundatrices: 4 Oregon, Benton County, McDonald State Forest, ex *Disporum smithii* (Hook.) Piper, 15 April 1994, A.S. Jensen (1 USNM, 1 CNC, 1 BMNH, 1 OSU).

Paratype apterae: 1 same data as holotype (USNM); 1 Oregon, Benton County, McDonald State Forest, ex *D. hookeri*, 1 May 1991, A.S. Jensen (OSU); 1 Oregon, Benton County, McDonald State Forest, ex *D. smithii*, 2 July 1991, A.S. Jensen (BMNH); 1 same data except the date: 16 October 1994 (OSU); 2 Oregon, Benton County, Willamette Park, ex *D. hookeri*, 2 June 1993, A.S. Jensen (1 CNC, 1 OSU).

Paratype alatae: 6 Oregon, Benton County, McDonald State Forest, ex *D. smithii*, 6 May 1994, A.S. Jensen (2 USNM, 1 CNC, 1 BMNH, 2 OSU).

Paratype oviparae: 2 Oregon, Benton County, McDonald State Forest, ex *D. smithii*, 20 October 1994, A.S. Jensen (1 OSU, 1 CNC); 2 same data except the date and host: ex *D. hookeri*, 25 October 1993 (1 USNM, 1 BMNH).

Paratype alate males: 3 Oregon, Benton County, McDonald State Forest, ex *D. smithii*, 20 October 1994, A.S. Jensen (1 USNM, 1 CNC, 1 BMNH); 1 same data except the date: 16 October 1994 (OSU).

Additional material.—Many apterae and oviparae and a few fundatrices, alatae, and

males from Oregon, mounted in Hoyer's medium, in the author's collection, OSU, and at Agriculture Canada, Vancouver, B.C.

Biology and distribution.—This species has a simple monoecious holocyclic life cycle on species of *Disporum*. It has been collected on *Disporum hookeri* (Torr.) Nicholson and *Disporum smithii* (Hook.) Piper. Both of these plants are perennial, and remain vegetative throughout the summer months. Alatae migrate readily from their home plant upon emergence. The species is often difficult to find in McDonald State Forest because it is not faithful to particular patches of plants year to year, as are some other species described above.

The aphid is known so far only from Oregon, Washington (recently identified from material at Washington State University, Prosser) and British Columbia. The two host plants are known from either west of the Cascades from British Columbia to California (*D. smithii*), or from British Columbia to NW Oregon and east to Alberta, Idaho and Montana (*D. hookeri*).

Remarks.—This species is similar to *M. violae*, *M. vancouveriae* and *M. parvifolii*, with which it shares the tendency to possess swollen siphunculi, frequent presence of four pairs of setae on the cauda, reduced pigmentation, and overall appearance. It differs from *M. violae* by its reduced ornamentation on the ventral surface of the head (Fig. 78), and its greater number of sensoria on a.s. III in alatae. It can be separated from *M. vancouveriae* by its distinctly fused gonapophyses. From *M. parvifolii*, it differs by having single spinules ventrally on the cauda, and a.s. V always shorter than a.s. III.

This is the only species of *Macrosiphum* in North America known to feed on *Disporum*. Another very similar species, *M. insularis*, feeds on similar lilies, *Streptopus amplexifolius*, and *Maianthemum* spp. in western North America. These are most easily separated by the longer tarsi in *M. insularis*, which has metatarsal II longer than u.r.s., as opposed to *M. wilsoni* in

which the metatarsal II is almost always shorter than the u.r.s. There is also a tendency in *M. wilsoni* to have longer siphunculi, being normally longer than a.s. III, while *M. insularis* often has the siphunculi shorter than a.s. III. Most specimens of *M. insularis* from the Pacific states have a dark a.s. VIa, whereas *M. wilsoni* has a pale or only slightly dusky a.s. VIa, even in the alatae and males. See also the key to lily-feeding *Macrosiphum* below.

This species occasionally has 4 setae on one or two of its tarsal segments I, the 4th seta placed laterally as in *Illinoia* or between the two longer lateral setae as in *M. tuberculiceps*. This, along with the normally slightly swollen siphunculi (Fig. 86), might suggest that it belongs in *Illinoia* rather than *Macrosiphum*. However, aside from the rare occurrence of 4 tarsal I setae, the species is so much more similar to the *Macrosiphum* mentioned in the preceding 2 paragraphs than any *Illinoia* that *Macrosiphum* is the certainly the proper generic placement for this species. The 4th tarsal I seta may indicate a relationship between *Macrosiphum* species similar to *M. wilsoni* and some *Illinoia* species, a relationship worthy of further exploration.

The species is named in honor of Harley Frost Wilson. Wilson was an unusually thorough American aphidologist who worked in Corvallis, Oregon in the second decade of the twentieth century. Several species were described by Wilson while working in Oregon, all of which were treated with detail and accuracy, including life histories where possible. This last habit was unusual in the practice of alpha taxonomy of aphids at that time.

KEY TO NORTH AMERICAN *MACROSIPHUM*
THAT FEED LILIACEAE (APTERAE AND
ALATAE)

Among the species described above, the most troublesome ones to identify are likely to be those that feed on the Liliaceae. There are several *Macrosiphum* in North America

that feed on Liliaceae, and they can be distinguished using the following key.

- 1. Apteræ with abdominal tergum thick, sclerotized ("leather-like"), sometimes slightly pigmented, usually remaining unwrinkled after slide mounting; longest setae on a.s. III less than 0.9 times the basal width of that segment; a.s. III always lightly imbricated throughout 2
 - Apteræ with tergum membranous, usually wrinkled or folded in slide mounts; longest setae on a.s. III usually 1.0 or more times the basal width of a.s. III; a.s. III often smooth, especially in middle 4
- 2(1). Head with scattered spinules dorsally; siphunculi brown; color in life brown or reddish brown; on *Maianthemum* spp., in the Pacific Northwest *Macrosiphum badium*, n. sp.
- Head without spinules dorsally; siphunculi of apteræ entirely pale or slightly dusky at tip, alatae with about basal one fourth of siphunculi pale; color in life white or cream-colored 3
- 3(2). Rostrum with u.r.s. equal to or longer than metatarsal II; a.s. VIa of apteræ normally pale, or with area of primary sensoria dusky; on *Disporum* spp. in the Pacific Northwest *Macrosiphum wilsoni*, n. sp.
- Rostrum with u.r.s. almost always shorter than metatarsal II; a.s. VIa of apteræ normally brown; on *Streptopus* and *Maianthemum* in western North America *Macrosiphum insularis* (Pergande)
- 4(1). Siphunculi not entirely brown to black, pale at least at base; on many plants including some Liliaceae, nearly worldwide, probably of North American origin *Macrosiphum euphorbiae* (Thomas)
- Siphunculi entirely brown to black, sometimes lighter at extreme base 5
- 5(4). Protarsal II with 3 pairs of dorsal setae; u.r.s. shorter than metatarsal II; on *Camassia* and *Zigadenus*, apparently heteroecious, with *Rosa* as primary host *Macrosiphum kiowanepus* (Hottes)
- Protarsal II with 2 pairs of dorsal setae; u.r.s. longer than metatarsal II 6
- 6(5). Cauda brown to black; a.s. III of apteræ with sensoria scattered over almost entire length; on *Maianthemum racemosum* and *Convallaria* in New York *Macrosiphum pechumani* MacGillivray
- Cauda pale; a.s. III of apteræ with sensoria limited to basal one half or less; on *Lilium* in eastern North America *Macrosiphum lilii* (Monell)

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